

ANNUAL MANAGEMENT REPORT KUSKOKWIM AREA, 1990

By:
R. Kim Francisco
Charles Burkey Jr.
Douglas B. Molyneaux
Cindy Anderson
Helen H. Hamner
Karen Hyer
Mike Coffing
Charles Utermohle

Regional Information Report¹ No. 3B91-77

Alaska Department of Fish and Game
Division of Commercial Fisheries, AYK Region
333 Raspberry Road
Anchorage, Alaska 99518

June 1991

¹ The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate timely reporting of recently collected information, reports to this series undergo only limited internal review and may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Division of Commercial Fisheries.

AUTHORS

R. Kim Francisco is Kuskokwim Area Management Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries, P.O. Box 90, Bethel, AK 99559-0090.

Cindy J. Anderson is the Assistant Area Management Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries, 333 Raspberry Road, Anchorage, AK 99518-1599.

Charles Burkey Jr. is Assistant Area Management Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries, P.O. Box 90, Bethel, AK 99559-0090.

Douglas B. Molyneaux is a Salmon Research Project Leader for the Alaska Department of Fish and Game, Division of Commercial Fisheries, 333 Raspberry Road, Anchorage, AK 99518-1599.

Helen Hamner is Regional Herring Coordinator for the Alaska Department of Fish and Game, Division of Commercial Fisheries, 333 Raspberry Road, Anchorage, AK 99518-1599.

Karen Hyer is Kuskokwim Sonar Project Leader for the Alaska Department of Fish and Game, Division of Commercial Fisheries, 333 Raspberry Road, Anchorage, AK 99518-1599.

Charles Utermohle is a Regional Biometrician for the Alaska Department of Fish and Game, Division of Subsistence, 333 Raspberry Road, Anchorage, Ak. 99518-1599.

Michael W. Coffing is a Resource Specialist for the Alaska Department of Fish and Game, Division of Subsistence, P.O. Box 1788, Bethel, Ak. 99559-1788.

In Memoria

It is with deep regret that we report the death of Timothy W. Heakin. On 25 February 1991 Tim died of natural causes while enroute to the Bethel hospital. Tim had been a permanent-seasonal Fish and Game Technician II for the Divisions of Commercial Fisheries and Subsistence. He was on seasonal leave without pay at the time of his death.

In addition to doing his job well during his first season, Tim showed good judgement in two separate crises. In one case he saved the life of a fellow employee by evacuating him by boat and plane. In the other crisis he stayed calm as flood waters rose around his knees and insured the safety of both state equipment and near by private property while waiting for the helicopter that evacuated him.

In the short time he worked for the Department, he gained the friendship and respect of the people who worked with him. His special assistance was greatly appreciated. He was a good friend and dedicated employee. He will be missed.

ACKNOWLEDGMENTS

Many people contributed toward the collection and processing of the data used in this report. Alaska Department of Fish and Game employees worked long and irregular hours at various locations throughout the Kuskokwim area collecting the data presented in this report. In particular, we would like to thank Doug Bue, Karen Samuelson, Kevin MacDonald, Mike Wade, Margaret Wilson, John Sargent, Chileen Perry, Joy Wintersteen, Allen Heikkila, Bob Roland, Jay Wilcox, Jeff Wallace, Brad Palach and Jon Becker. In addition, we would like to recognize Joe

Wilson, a volunteer on the Kuskokwim Bay Catch Monitor project for all his help. Ignatti Ignatti and Evon Ignatti provided welcome transportation and friendship to the Kogrukluk Weir crew. A special thanks goes to Bobbi Fisher, Fish and Game Field Office Assistant, for putting up with all of us. Salmon Processors contributed data, communications, transportation and advice. The subsistence and commercial fishermen who voluntarily provided their time, skill and knowledge are gratefully acknowledged. The United States Fish and Wildlife Service, Yukon Refuge provided valuable flight time, meeting space, and advice.

TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES	v
LIST OF FIGURES	vi
LIST OF APPENDICES	vii
PREFACE	1
PART I. INTRODUCTION: SALMON FISHERY	2
Area and District Boundaries	2
Fishery Resources	2
Management Programs	3
SUBSISTENCE FISHERY	5
Background	5
Subsistence Salmon Fishing Regulations	5
Participation	5
Licenses, Permits, and Gear	6
In-Season Closures	6
Subsistence Salmon Harvest Surveys	6
Methods	6
Catch Calendars	7
Household Surveys	7
Postcard and Telephone Surveys	8
Subsistence Salmon Harvest Estimation	8
1990 Sampling Summary	10
1990 Harvest Summary	11
COMMERCIAL FISHERY	11
ENFORCEMENT	11
Kuskokwim River	12
Chinook Salmon	14
Sockeye Salmon	14
Chum Salmon	15
Coho Salmon	15
Pink Salmon	16
Roe Sales	16
Quinhagak, District 4, All Salmon Species	16
Goodnews Bay, District 5, All Salmon Species	18
OUTLOOK FOR 1991	19
Chinook Salmon	19
Sockeye Salmon	19
Chum Salmon	19
Coho Salmon	20
FRESHWATER FIN FISH FISHERY	20
Subsistence Fishery	20
Commercial Fishery	20
Status of the Stocks	21
MISCELLANEOUS SALTWATER FINFISH	21

TABLE OF CONTENTS (continued)

PART II. INTRODUCTION: HERRING FISHERY	22
Area and District Boundaries	22
Management Programs	22
Season Summary	22
STOCK STATUS	23
Assessment Methods	23
Spawning Populations	23
Security Cove District	23
Goodnews Bay District	23
Cape Avinof District	24
Nelson Island District	24
Nunivak Island District	24
SUBSISTENCE FISHERY	24
COMMERCIAL FISHERY	25
Security Cove District	25
Goodnews Bay District	25
Cape Avinof District	26
Nelson Island District	26
Nunivak Island District	26
OUTLOOK AND MANAGEMENT STRATEGY FOR 1991	26
Security Cove District	27
Goodnews Bay District	27
Cape Avinof District	27
Nelson Island District	27
Nunivak Island District	28
LITERATURE CITED	29
APPENDICES	70

LIST OF TABLES

<u>TABLE</u>	<u>Page</u>
1. 1990 Kuskokwim Area fish ticket summary.....	38
2. Lower Kuskokwim River, District 1, commercial salmon harvest and fishing effort by period, 1990.....	39
3. 1990 Kuskokwim Area subsistence salmon project sampling survey.....	40
4. 1990 Kuskokwim Area subsistence salmon harvests.....	41
5. Kuskokwim Area salmon entry permits issued by village, 1990.....	42
6. Kuskokwim Area commercial and subsistence salmon catches by species and district, 1990.....	43
7. 1990 Kuskokwim Area commercial salmon fishery final calculated by district and area.....	44
8. Executive summary of department and working group actions, 1990.....	45
9. Middle Kuskokwim River, District 2, commercial salmon harvest and fishing effort by period, 1990.....	47
10. Quinhagak, District 4, commercial salmon harvest and fishing effort by period, 1990.....	48
11. Peak aerial survey salmon escapement estimates in Kuskokwim spawning tributaries by species, 1990.....	49
12. Goodnews Bay, District 5, commercial salmon harvest and fishing effort by period, 1990.....	50
13. Preliminary projections of the 1991 Kuskokwim Area commercial salmon harvests in thousands of fish by species.....	51
14. Kuskokwim Area Pacific herring proportion of biomass by age class, 1990.....	52
15. Kuskokwim Area Pacific herring age frequency by district, 1990.....	53
16. Summary of Pacific herring commercial harvest by fishing period for Kuskokwim Area fishing districts, 1990.....	54
17. Projections of Pacific herring spawning biomass and harvest for commercial fishing districts in the Kuskokwim Area, 1991.....	55

LIST OF FIGURES

<u>FIGURE</u>	<u>Page</u>
1. Kuskokwim Area Map.....	57
2. Kuskokwim Management Area, District 1.....	58
3. Kuskokwim Management Area, District 2.....	59
4. Kuskokwim Management Area District 4, Quinhagak, 1990.....	60
5. Kuskokwim Management Area District 5, Goodnews Bay 1990.....	61
6. Escapement at Kogrukluuk weir and CPUE for coho salmon in District W-2.....	62
7. Kuskokwim drainage aerial chinook salmon escapements index, 1990.....	63
8. Goodnews Bay and Security Cove Herring District, 1990.....	64
9. Cape Avinof Herring District.....	65
10. Nelson Island Herring District.....	66
11. Nunivak Island Herring District.....	67
12. Age composition of Pacific herring in spawning populations and commercial harvest, Kuskokwim Area, 1990.....	68

LIST OF APPENDICES

<u>APPENDIX A</u>	<u>Page</u>
A.1 Kuskokwim Area escapement index objectives for chinook, sockeye, coho and chum salmon.....	71
A.2 Estimated dollar value of Kuskokwim Area commercial salmon fishery, 1964-1990.....	72
A.3 Kuskokwim Area commercial, subsistence and personal use salmon catches, 1913-1990.....	73
A.4 Historic salmon escapement data from current Kuskokwim Area projects, 1976-1990.....	75
A.5 Kuskokwim Area subsistence chinook salmon harvest by village, 1960-1990.....	76
A.6 Kuskokwim Area subsistence chum salmon harvest by village, 1985-1990.....	80
A.7 Mean salmon weights and prices paid to commercial fishermen, Kuskokwim Area, 1967-1990.....	81
A.8 Fishes commonly found in the Kuskokwim Area.....	82
A.9 Kuskokwim River distances.....	83
A.10 Kuskokwim Area subsistence sockeye salmon harvest by village, 1985-1990.....	85
A.11 Kuskokwim Area subsistence coho salmon harvest by village, 1985-1990.....	86
 <u>APPENDIX B</u>	
B.1 Associated environmental and catch data, Bethel, Kuskokwim River, 1965-1990.....	88
B.2 Comparative chinook salmon catches by fishing period by year in District 1, Lower Kuskokwim River 1974-1990.....	89
B.3 Comparative sockeye salmon catches by fishing period by year in District 1, Lower Kuskokwim River 1981-1990.....	96
B.4 Comparative chum salmon catches by fishing period by year in District 1, Lower Kuskokwim River 1981-1990.....	100
B.5 Lower Kuskokwim River, District 1, and the middle Kuskokwim River, District 2, combined commercial salmon harvest, 1960-1990.....	106
B.6 Kuskokwim River chum salmon return per spawner index, 1980-1990.....	107
B.7 Kuskokwim River chinook salmon cumulative mean tidal test fishing CPUE and percent by catch by day, 1984-1990.....	108
B.8 Kuskokwim River sockeye salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-1990.....	110

LIST OF APPENDICES (Continued)

	<u>Page</u>
B.9 Kuskokwim River coho salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-1990.....	112
B.10 Kuskokwim River chum salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-1990.....	114
B.11 Commercial coho salmon catches by period, lower Kuskokwim River (District 1), 1974-1990.....	116
B.12 Kuskokwim River escapement of chinook salmon by age and sex, 1982-1990.....	121
B.13 Comparative chinook salmon catches by fishing period by year in District 2, Middle Kuskokwim River, 1985-1990.....	122
B.14 Comparative sockeye salmon catches by fishing period by year in District 2, Middle Kuskokwim River, 1985-1990.....	124
B.15 Comparative chum salmon catches by fishing period by year in District 2, Middle Kuskokwim River, 1985-1990.....	126
B.16 Comparative coho salmon catches by fishing period by year in District 2, Middle Kuskokwim River, 1985-1990.....	128
B.17 Utilization of Kuskokwim River chinook salmon 1960-1990.....	130
B.18 Chinook salmon sex ratios and proportion of females with gill net marks, Kogrukluks weir, 1979-1990.....	131
B.19 Estimated swimming speed of salmon in the Kuskokwim River.....	132
B.20 Lower Kuskokwim River, District 1, commercial effort 1970-1990.....	133
B.21 Middle Kuskokwim River, District 2, commercial effort 1970-1990.....	134
<u>APPENDIX C</u>	
C.1 District 4, Quinhagak, chinook salmon commercial and escapement age composition, 1982-1990.....	136
C.2 Kanektok River peak aerial surveys by species, 1959-1990.....	139
C.3 Historical age composition percentage, sockeye salmon, Quinhagak commercial harvest and escapement, 1982-1990.....	140
C.4 Historical age composition percentage, chum salmon, Quinhagak commercial harvest and escapement, 1982-1990.....	142
C.5 Summary of historical commercial harvest by period, Quinhagak District, sockeye salmon, 1981-1990.....	144
C.6 Summary of historical commercial harvest by period, Quinhagak District, chum salmon, 1981-1990.....	146
C.7 Quinhagak District commercial salmon harvest, 1960-1990.....	148

LIST OF APPENDICES (Continued)

	<u>Page</u>
C.8 Summary of historical commercial harvest by period, Quinhagak District, chinook salmon, 1981-1990.....	149
C.9 Quinhagak District commercial salmon effort, 1970-1990.....	151
C.10 Summary of historical commercial harvest by period, Quinhagak District, coho salmon, 1979-1990.....	152

APPENDIX D

D.1 Peak aerial survey results, Goodnews River, 1979-1990.....	155
D.2 Historical age composition percentage, chinook salmon Goodnews Bay commercial harvest and escapement, 1982-1989.....	157
D.3 Historical estimated run size and commercial exploitation rate, Goodnews River, 1981-1990.....	159
D.4 Historical age composition percentage, sockeye salmon Goodnews Bay commercial harvest and escapement, 1982-1989.....	160
D.5 Goodnews Bay District commercial salmon harvest, 1968-1990.....	163
D.6 Average cumulative estimated escapement and proportion by day for chinook, sockeye and chum salmon, Goodnews River counting tower project, 1981-1990.....	164
D.7 Historical age composition percentage, chum salmon, Goodnews Bay commercial harvest and escapement, 1982-1989.....	166
D.8 Summary of commercial harvest by period, Goodnews Bay District, chinook salmon, 1981-1990.....	169
D.9 Summary of commercial harvest by period, Goodnews Bay District, sockeye salmon, 1981-1990.....	172
D.10 Summary of commercial harvest by period, Goodnews Bay District, chum salmon, 1981-1990.....	175
D.11 Summary of commercial harvest by period, Goodnews Bay, coho salmon, 1981-1990.....	178

APPENDIX F

F.1 Commercial freshwater fin fishery catch data, Kuskokwim Area, 1967-1990.....	181
---	-----

APPENDIX G

G.1 Commercial miscellaneous saltwater finfishery catch data, Kuskokwim Area, 1988-1990.....	183
---	-----

LIST OF APPENDICES (Continued)

Page

APPENDIX H

H.1	Estimated biomass and commercial harvest of Pacific herring in Kuskokwim Area fishing districts, Alaska, 1981-1990.....	185
H.2	Pacific herring subsistence harvest (st) and effort data from selected Kuskokwim Area, Alaska, 1975-1990.....	186
H.3	Number of buyers and fishermen participating in Kuskokwim Area Pacific herring fisheries, Alaska, 1981-1990.....	187

APPENDIX S

S.1	Subsistence salmon survey calendar, June and July 1990.....	189
S.2	Subsistence salmon survey calendar, August and September 1990.....	190

PREFACE

This is the twenty-ninth annual management report detailing the management activities of the Division of Commercial Fisheries staff in the Kuskokwim Area. The 1960-1974 management reports for the "Kuskokwim District" appear in the Arctic-Yukon-Kuskokwim Area report series. The 1975-1986 management reports appear in the Kuskokwim Area Annual Report series. The annual management report became a part of the Regional Information Report Series in 1987.

Data presented in this report supersedes information found in previous management reports. This report includes summary data from many special research projects. Complete documentation of these projects and results appear in separate reports. Some of the data presented is preliminary and may be presented with minor differences in future reports.

Subsistence catch estimates for the years before 1978 are different from the estimates presented in the Kuskokwim Area Annual Management Reports for 1978 through 1984. The historical data was reanalyzed in 1978 and tables were revised accordingly. The method and the reason for the revision was not recorded. In an effort to standardize the subsistence catch data, the estimates originally reported in the Management Reports before 1978 have replaced the 1978 revisions.

To simplify use of this report, the tabular data are separated into current year tables and appendix tables. The appendix tables are separated by species and fishing district. The appendix tables show annual comparisons and information that seldom change.

"Total fishermen" is the term used to represent the total number of fishermen who made at least one delivery during a particular interval. In the past many area fishermen only delivered once or twice during each season. The increasing importance of cash in the area economy has resulted in higher levels of sustained effort throughout the fishing season.

"Total fishermen hours" is the product of the number of unique CFEC permits used in a fishing period multiplied by the total number of hours the district was open to commercial fishing. The catch divided by the resulting number of fishermen hours equals catch per fishermen hour (catch per unit effort or C.P.U.E.).

Computer tabulations of fish tickets provide the commercial catch data presented in this report. The computer software program used to tabulate fish ticket data is the statewide system provided by the Division of Commercial Fisheries Computer Services section. During 1990 the Bethel office tabulated 13,776 fish tickets (Table 1).

PART I. INTRODUCTION: SALMON FISHERY

Area and District Boundaries

The Kuskokwim Area includes all waters of Alaska between Cape Newenham and the Naskonat Peninsula, plus Nunivak and St. Matthew Islands (Figure 1). Commercial salmon fishing occurs in four districts in the area:

District 1, the Lower Kuskokwim River, consists of the Kuskokwim River from a line between Apokak Slough and Popokamiut, upstream to a line between ADF&G regulatory markers located about one mile above the Tuluksak River (Figure 2). The downstream boundary has been in effect since 1986 and the upstream boundary was first used in 1990.

District 2, the Middle Kuskokwim River, consists of the Kuskokwim River from ADF&G regulatory markers located at the upstream entrance to the second slough on the west bank downstream from Kalskag to the regulatory markers at Chuathbaluk (Figure 3). The downstream boundary of District 2 was used for the first time in 1990.

District 4, Quinhagak, consists of the waters of Kuskokwim Bay between the mouth of Weelung Creek (misspelled in the regulations as Wheeling) and the South Mouth of the Arolik River (Figure 4). The northern boundary was new in 1990 and the first boundary change since 1960.

District 5 consists of the waters of Goodnews Bay (Figure 5). This boundary has been in effect since the inception of the fishery in 1968.

The W precedes the district number on the figures and in news releases (eg. W-1). This helps the public differentiate between announcements for the Yukon River districts (Y) and the Kuskokwim River (W) districts. W is the letter code assigned to the Kuskokwim by the Commercial Fisheries Entry Commission.

Fishery Resources

Six species of Pacific salmon are indigenous to the area; chinook or "king" salmon (*Oncorhynchus tshawytscha*), sockeye or "red" salmon (*O. nerka*), coho or "silver" salmon (*O. kisutch*), pink or "humpy" salmon (*O. gorbuscha*) chum or "dog" salmon (*O. keta*) and rainbow trout (*O. mykiss*). The Kuskokwim River drainage has the largest populations of chinook, sockeye, coho and chum salmon in the area. Pink salmon occur throughout the area. Little quantitative data on the population size of pink salmon is available because of the lack of commercial markets and interest by subsistence fishermen. Rainbow trout are rare or absent upstream of the Aniak River drainage and west of the Kuskokwim River. The largest populations in the area are found in the Kanektok and Goodnews Rivers. There is no commercial fishery on rainbow trout and little subsistence harvest information for this species has been collected (Coffing in prep; USF&WS files). Overall, the contribution to the subsistence fishery throughout the Kuskokwim area has not been quantified. There is a growing sport fishery on all six species that is documented by the Division of Sport Fish.

The management objective for all species and districts is to achieve desired escapement objectives and allow for the orderly harvest of fish surplus to spawning requirements. Subsistence uses receive the highest priority among beneficial uses of the resources.

Management Programs

The vast size of the area and the turbid nature of many streams make accurate estimates of the size of salmon returns and spawning escapements difficult to obtain. The relative lack of comparative catch data, caused by the expansion of the fisheries since their initiation, hampers management. Management of the commercial harvest is complicated by the need to provide optimum spawning escapements, as well as sufficient harvest to the important subsistence fishery. In recent years, salmon migratory timing data bases have become extensive enough to assist in-season management.

Prior to 1983, a management strategy of conservatively increasing the level of commercial catch to establish definite trends between catch and escapement allowed development of the fishery. The area's escapement data base allowed the assignment of provisional salmon spawning escapement objectives in major spawning systems in 1983. These objectives, an average of aerial survey, tower, weir, and sonar indices obtained in these systems since 1960 under good to fair conditions (Appendix A.1). Indices obtained under poor conditions (primarily turbid water or radically incomplete counts) were excluded. Unusually large chum salmon surveys from the Tuluksak River and Kanektok River data bases were removed from the index calculations because of their disproportionate effect. A typographical error in the Kisaralik River escapement objectives was detected in the preparation of this report and the objectives corrected.

The index of annual spawning escapements is accomplished through aerial surveys of streams and lakes. A weir on the Kogruklu River, a sonar counter in the Aniak River, and a counting tower on the Goodnews River provide more accurate estimates of escapement and allow calibration of some aerial surveys. Turbid water conditions and inclement weather often prevent accurate aerial estimates of escapement. In 1990 forest fires in the upper Kuskokwim drainage prevented surveys in that vicinity.

The sockeye salmon escapement objective for the Kanektok River was revised in 1990. Previously the objective had been the average of the surveys obtained from 1960 to 1983, which was 32,000. It was revised to 15,000 in 1990. The aerial survey count as a percentage of the tower count in the neighboring Goodnews River showed the aerial surveys ranged from 11 to 85 percent of tower count (Appendix D.3). The sonar counts conducted in the Kanektok River also showed that the peak aerial survey was under recording the total sockeye salmon escapement (Schultz 1983, Huttunen 1984 & 1986). In the near by Togiak District sockeye salmon runs have supported a 20 year average exploitation rate of 52 to 61 percent (Bill 1988). The 10 year average catch of sockeye salmon in District 4 is 16,168 (Appendix C.7). Given the underestimate by the aerial survey, the sustainable harvest rate, and the average harvest, the escapement objective of 32,000 appeared to high. The new objective of 15,000 should result in a conservative exploitation rate, less than 50 percent, which will allow an increased sockeye salmon catch without endangering the sustained yield of the run.

Attainment of escapement objectives is needed to maintain salmon runs at recent historic levels. Future adjustment of objectives may be required to optimize salmon production. Improvement of the escapement assessment program continues to be a priority.

The change from a harvest-guideline-based management strategy to an escapement-objective-based strategy in 1983 appears to be increasing the average harvest (Appendix A.3). It is too early to determine if the escapement-based management strategy will provide a long term increase in production in the Kuskokwim Area.

Adjustments of the number and duration of commercial fishing periods and time intervals between periods are the primary methods of distributing the harvest throughout the run. This avoids over-harvesting discrete stocks and allows harvests to remain within guidelines, achievement of escapement objectives, and

sufficient fishing time for the subsistence fishery. Commercial fishing periods vary between 6 and 36 hours in length depending on the species, effort, and return magnitude.

In 1987 the Board of Fisheries, Department of Fish and Game, local Fish and Game Advisory Committees, local subsistence, and commercial fishermen agreed to work together to increase the sustained yield of Kuskokwim River salmon stocks. The JOINT STATEMENT ON THE MANAGEMENT OF THE KUSKOKWIM RIVER SALMON FISHERY was adopted by the Board of Fish as a result (ADF&G 1990A).

To achieve the goal the Kuskokwim River salmon users formed the Kuskokwim River Salmon Management Working Group (Working Group):

1. To arrive at a consensus regarding the openings and closures of the Kuskokwim River fishery.
2. To work towards the development of a comprehensive management plan for all Kuskokwim River salmon stocks.

Adjustments of commercial fishing time in Districts 4 and 5 are made by the Department during the season. Adjustments are in response to run magnitudes and allow the harvest of salmon surplus to the needed spawning escapement. Run magnitude is measured by commercial catch data and by various Department escapement studies.

Several research projects help with assessing in-season run strength. A industry-Department test fishery for salmon began in 1988 near the downstream boundary of District 1. The Working Group developed the operational plan, and the test fishery was sponsored by Kuskokwim River processors and the Department in 1990. This test fishery index provides an earlier assessment of run strength than the Department test fishery located near Bethel.

The summer of 1990 marked the third year of operation for the Kuskokwim Sonar. A transducer was deployed on the right bank from 1 June to 14 August. Fish spatial distribution was determined by sampling a lateral transect with a vertical looking transducer. Using horizontal fish distribution information the right bank sonar counts were expanded for area not ensonified. A test net was deployed 10 meter upstream from the transducer. There was no detectable spatial separation between salmon and non-salmon species; both salmon and non-salmon species were intercepted from 2 through 50 m from shore. Sonar test fishing indices were used to segregate counts attributable to whitefish. Daily passage estimates were provided for area managers in a timely manner. There was a poor correlation between sonar counts and Bethel test fishing indices. Partial explanation of these data may be in the difference of sampling frequency. Commercial catch and sonar estimates correlated well for the majority of the summer. The commercial catch mirrored sonar estimates for 5 July through 6 August.

The Kuskokwim River Salmon Working Group developed a program to provide CPUE information from the subsistence fishery. This program was sponsored by the Kuskokwim Fishermen's Cooperative and the Department through a contract. It was very successful at providing subsistence CPUE information from Districts 1 and 2. It is a great improvement over the previous ad-hoc reporting system used by the Department. Biometric analysis of the program in 1988 resulted in fewer sampling stations being used in 1989. Further analysis and budget considerations resulted in four sampling stations in 1990. Data interpretation is still a problem with this program and its main value lies in the anecdotal information it supplies.

Communicating management plans and decisions to the public is always difficult. Many of the people in the Kuskokwim Area cannot read or speak English. More often English is a second language which increases the challenge of communicating

management plans and decisions. The Department and the Working Group worked closely together which dramatically improved the acceptance and understanding of many users. Special regulation notices were broadcast over local radio stations and over VHF and CB radio in English and Yup'ik.

A weekly English language fishery program is broadcast over radio station KYUK in Bethel. The program provides information on regulations, biology, and fisheries management throughout the year.

SUBSISTENCE FISHERY

Background

Subsistence fishing and summer fishing camps have a long history in the Kuskokwim Area. Many families throughout the area rely on the harvest of fish and wildlife for subsistence use which continue to be an important component of the local economy. During summer, the day-to-day activities of many households focus around the harvesting, processing, and preserving of salmon for subsistence use.

The Kuskokwim Area subsistence salmon fishery is one of the largest and most important in the state, with nearly 1,300 households harvesting salmon. Many other households, which may not be directly involved in actual harvesting, assist fishing households with processing and preservation activities.

There are 37 communities within the Kuskokwim Area (Figure 1). These communities consist of over 3,300 households, many of which fish for salmon for subsistence purposes. Approximately 2,600 of these households comprising 26 communities are situated along the Kuskokwim River or its tributaries. Residents of Kwigillingok, Kongiganak, and Kipnuk, situated along the northern shore of Kuskokwim Bay, comprise 184 households. Residents from these three communities are thought to harvest primarily Kuskokwim River salmon stocks.

In the southern portion of the Kuskokwim Area, residents of Quinhagak, Goodnews Bay, and Platinum, comprised of just over 200 households, utilize stocks primarily from the Kanektok, Arolik, Goodnews river systems. Residents of Bering Sea coast communities of Mekoryuk, Toksook Bay, Nightmute, Tununak, and Newtok, consisting of approximately 300 households, harvested salmon bound for both local and more distant (Yukon-Kuskokwim) drainages.

All six species of salmon (rainbow trout included) are harvested for subsistence use. Annual subsistence harvest surveys have been aimed at gathering data on only chinook, sockeye, chum, and coho salmon. Subsistence catches of chinook salmon in the Kuskokwim Area often exceed the commercial catch of this species (Table A.3.).

Subsistence Salmon Fishing Regulations

Participation

Prior to 1988, any resident of Alaska could harvest Kuskokwim Area salmon for subsistence use. During 1988 and 1989, only Alaska residents domiciled in the Kuskokwim Area could take Kuskokwim Area salmon for subsistence uses. In December 1989, the Alaska Supreme Court ruled in McDowell v. State of Alaska that the rural preference in the State subsistence statute violated the Alaska Constitution. As a result of that decision, all Alaska residents domiciled in the State for at least 12 months became eligible to harvest salmon in the Kuskokwim Area for subsistence use.

Licenses, Permits, and Gear

In 1990 licenses and permits were not required for subsistence fishing in the Kuskokwim Area. Salmon harvested for subsistence use could be caught using set and drift gill nets, beach seines, and fishwheels. In the Holitna River drainage only, spears could also be used. The total length of set or drift gill nets in use by an individual could not exceed 50 fathoms. Gill nets could be of any sized mesh, however, nets with six inch or smaller mesh could not be more than 45 meshes in depth and nets with greater than six inch mesh could not be more than 35 meshes in depth. All gill nets used for subsistence fishing were required to have a buoy attached with the name and address of the operator written on it. Fishwheels were also required to have the name and address of the operator inscribed on the side of the fishwheel facing midstream of the river (ADF&G 1990). There were no restrictions on the number of salmon that could be harvested by individual fishermen or households.

In-Season Closures

Generally speaking, many of the fishermen involved in the subsistence fishery are local residents who also participate in the commercial fishery. During 1990, subsistence salmon fishing was closed in the commercial fishing districts and adjacent areas before, during, and after each commercial fishing period. The purpose of these closures was to discourage illegal commercial fishing and to help prevent the sale of subsistence caught salmon in the commercial fishery. In the Lower Kuskokwim region (District 1), only the commercial fishing district and Kuskokuak Slough areas were affected; the spawning tributaries remained open to subsistence fishing throughout the season (Figure 2). In the Middle Kuskokwim (District 2), Quinhagak (District 4), and Goodnews Bay (District 5), both the districts and the spawning tributaries were closed before, during, and after commercial periods. That portion of the Kuskokwim River between Districts 1 and 2 was closed to subsistence fishing at the same time subsistence closures occurred in District 1.

Unless affected by the commercial fishery, as described above, the subsistence fishery remained open. For example, subsistence closures in District 1 occurred 16 hours before, during, and 6 hours after each commercial fishing period. During 1990, between June 19 and August 28, the subsistence fishing closures before, during, and after commercial periods in District 1 totaled 369 hours (or 15.4 total days). During the same time, commercial salmon fishing in District 1 was opened for a total of 83 hours (3.5 total days) (Table 2).

Subsistence Salmon Harvest Surveys

The management of Kuskokwim Area salmon fisheries requires that the Department know how many salmon are harvested in both the subsistence and commercial fisheries. Data on the subsistence harvest of salmon is collected annually. The Division of Commercial Fisheries began annual subsistence salmon harvest surveys along the Kuskokwim River in 1960, in Quinhagak in 1967, and in Goodnews Bay and Platinum in 1979. In 1988 the Division of Subsistence took over the annual subsistence salmon harvest surveys under a memorandum of agreement with the Division of Commercial Fisheries and have been responsible for collecting and analyzing the data since that time.

Methods

During 1990, three methods were used to gather subsistence salmon harvest data. These methods were: 1) subsistence salmon catch calendars, 2) post-season community surveys of Kuskokwim Area households, and 3) postcard and telephone surveys. In early 1990, after the 1989 data analysis had been completed, the

Division of Subsistence updated its household list database in order to better define households potentially harvesting Kuskokwim Area salmon stocks in 1990 for subsistence use. Each household in the database was designated as either "usually fish" or "usually does not fish" depending on past fishing history. Households listed in the database were the basis of sampling and estimation of subsistence salmon harvests for the Kuskokwim Area. Each household on the list was assigned a unique identifier through which subsequent information could be tracked.

Catch Calendars

In May 1990, subsistence salmon catch calendars were mailed to all Kuskokwim Area households which had been identified as "usually fish." Three similar but unique catch calendars were designed for recording the daily catch of each salmon species harvested for subsistence use (Appendix S 1.). One style of calendar was sent to households in communities along the Lower and Middle regions of the Kuskokwim River, to communities along the Bering Sea coast, and to communities in the Upper Kuskokwim River region upstream as far as the community of Stony River. A second style of calendar was sent to the remaining households in the Upper Kuskokwim River region and a third style was sent to households in Quinhagak, Goodnews Bay, and Platinum. Where addresses were available, the calendars were mailed to post office boxes; otherwise calendars were sent general delivery for the post office clerk to distribute. Each calendar was postage paid and addressed for return to the Bethel Division of Subsistence office. Over 1,500 subsistence salmon catch calendars were distributed to Kuskokwim Area households.

Household Surveys

The second method of collecting subsistence salmon harvest information was the post-season household surveys. With this method, staff traveled to communities in the Kuskokwim Area and went house-to-house interviewing residents about their 1990 salmon fishing efforts. Similar to the approach used in developing the catch calendars, three color coded survey instruments were developed and used (Appendix S.2). Except for local terms used for the salmon species, the survey questions asked in each region were identical.

The goals of the post-season survey were to:

- 1) collect harvest data that would result in a total harvest estimate for subsistence salmon by species for the Kuskokwim drainage and by community;
- 2) compile information on fishing effort, gear types, participation rates, and timing of the subsistence harvest;
- 3) identify salmon harvest issues;
- 4) update community household lists and identify fishing households.

Thirty-one communities were targeted for post-season surveys over a two month period beginning in early October after most residents had completed salmon fishing for the season and after most hunters had returned home from fall moose and caribou hunting. Communities in which residents usually harvest salmon through October were surveyed in November. Division of Subsistence staff conducted house-to-house surveys in 28 communities. House-to-house surveys were not done in Bethel primarily because of its large size and time constraints placed on staff due to funding limitations. For the same reasons, house-to-house surveys were also not done in Telida and the five Bering Sea coast communities. Kipnuk and Kwigillingok did not wish to allow staff to conduct house-to-house surveys in their communities.

Survey work was conducted systematically. Prior to beginning the community surveys, efforts were made to inform and prepare residents for the arrival of staff doing the surveys. This was done weeks or days in advance of their arrival through letters to City, IRA, or Traditional council offices in each community, radio announcements, posters in public buildings and phone calls to community officials.

Upon arrival in a community, staff checked in with the city office to introduce themselves and outline their task. Staff used community household "checklists", prepared in advance, to help them identify households they needed to contact while conducting the household surveys. Each "checklist" contained a listing of all known households in the community, identified which households were reported to have subsistence fished in 1989, which households were mailed 1990 catch calendars, and which households had already returned their catch calendars to the Department. Knowledgeable individuals in the community helped to update the community household list and identify which households "usually fish" and which households "usually did not fish." In addition, these individuals helped to identify households that subsistence fished for salmon in 1990.

Staff attempted to contact all households that were either identified as "usually fish" or were known to have fished during 1990. Structured interviews were conducted with these households through the use of a survey instrument (described below) and subsistence salmon catch calendars that had not been mailed were also collected. If time permitted, other households on the community list were contacted about their salmon fishing activities, if any. A typical community visit lasted one to two days.

Postcard and Telephone Surveys

The third method of collecting information on subsistence harvest of salmon was through the use of postcard surveys and telephone interviews (Appendix S 3.). The postcard survey simply asked if the household harvested salmon from the Kuskokwim Area for subsistence use, the quantities harvested, the type of fishing gear used. The postcard could be separated in half and returned postage paid. This type of survey was the primary method of obtaining harvest data from "usually fish" households in Bethel, Telida, Kipnuk, and the five Bering Sea coast communities. Postcards were also initially used to obtain data from McGrath households.

Postcard surveys were mailed out to Bethel and McGrath households in early October. McGrath households that had not returned their catch calendar or postcard survey were contacted by staff in November as the Upper Kuskokwim communities were being surveyed. Bethel households that had not returned either a postcard survey or catch calendar by early November were then contacted by telephone or again by a second postcard survey. A primary factor limiting contacts of Bethel households was that for many, neither a mailing address nor telephone number was available. Households in other communities that were not available during the staff visits to conduct house-to-house surveys and had not returned their salmon catch calendar were also mailed postcard surveys.

Subsistence Salmon Harvest Estimation

Information from the three information sources (catch calendars, household surveys, postcard/telephone surveys) was entered into a microcomputer database. Data were verified against source documents, and several logic checks of the data were made. The master list of names and addresses of resident households was updated to reflect changes in household composition and number of households residing in each community. The unique household numbering system was maintained on the master list and on the database tables containing information from each of the three information sources.

In order to provide a single best estimate for a household's harvest of a salmon species during 1990, information was composited from the various information sources. This process was conducted by a single researcher on the project to ensure data consistency. In most cases, there were few discrepancies between the information available from the different sources. In those cases where a household was determined to have fished for salmon, but no salmon harvest could be quantified through any information source, the harvest was identified as "missing."

Guidelines developed during the course of the process to composite harvest information included:

- (1) the assumption that the salmon catch calendar contained the best means of recording the household's harvest;
- (2) that information from the different sources needed to be evaluated concurrently in order to identify the harvest for each species;
- (3) that information from the different sources for a particular species may be different due to the timing of the collection of this information;
- (4) that information on the use of salmon fed to dogs be used as a minimum estimate of the household's harvest if no other information is available.

Salmon harvests identified as "removed from the commercial catch for subsistence use" were included in the household's subsistence harvest.

The average community catch (C_k) was estimated for salmon species from the composite catch per household data. Mean community catch (C_k) was estimated by

$$C_k = \sum_{i=0}^1 (N_{ki} * C_{ki}) / \sum_{i=0}^1 N_{ki}$$

where

k = community

i = indicates whether the group "usually fishes" (1) or "usually does not fish" (0)

N_{ki} = number of households that "usually fish" or "usually does not fish"

C_{ki} = mean harvest for households that "usually fish" or "usually does not fish"

The total community catch (T_k) was estimated by

$$T_k = \sum_{i=0}^1 (N_{ki} * C_{ki})$$

and its variance (V_k) includes a finite population correction factor

$$V_k = \sum_{i=0}^1 ((N_{ki}^2) (1 - (n_{ki}/N_{ki})) (s_{ki}^2/n_{ki}))$$

where

n_{ki} = number of households for which information is available that "usually fish" or "usually does not fish"

s_u^2 = variance for the amount harvested for the "usually fish" or "usually does not fish" households.

Community catch estimates and their variances were summed across communities for region subtotals and across all regions for Area totals.

1990 Sampling Summary

Table 3 presents data on the number of households contacted using the three means of data collection. Of the estimated 3,317 households in communities located in the Kuskokwim Area, information was obtained on 2,080 (63%).

More than 1,300 households have been classified as "usually fish". In 1990, subsistence salmon harvest information was collected from approximately 93% of these households. Approximately 79% of these households harvested salmon for subsistence in 1990.

Approximately 2,000 households have been classified as "usually do not fish" for subsistence salmon. Information was collected from 866 (43%) of these households of which 235 subsistence fished in 1990. More than half of the households classified as "usually do not fish" resided in Bethel.

Of the 2,632 defined households living in communities along the Kuskokwim River drainage, 1,807 (68.6%) were contacted. Overall, fishing status information during 1990 was determined for 1,828 (69.4%) of these households. Information was especially absent for Bethel where 623 households (51%) did not provide fishing or harvest data to the Department or were otherwise not contacted. A total of 1,807 households along the Kuskokwim River drainage were contacted by at least one of the three means of data collection. The majority of contacts (945) were through household survey interviews. Of the total 1,828 households for which there was information, approximately 60% (1,094) were determined to have fished for subsistence salmon in 1990.

In the southern Kuskokwim Bay communities of Quinhagak, Goodnews Bay, and Platinum, the majority (76.5%) of the 204 households living in the region were contacted. Fishing status information for 1990 was gathered for 84% (171) of the region households. Of these 171 households, 117 (68%) fished for subsistence salmon in 1990.

In Kongiganak, Kipnuk, and Kwigillingok, communities along northern Kuskokwim Bay, data was obtained on the 1990 fishing efforts of 60 households. The majority of the data available came from Kongiganak (53 households) and there was very little response from either Kipnuk (7) or Kwigillingok (0). As mentioned above, neither Kipnuk or Kwigillingok wanted staff to conduct house-to house surveys in their communities. In Kongiganak, information was gathered from 53 (96%) of the 55 households. Sixty-four percent of the households in Kongiganak reported fishing for subsistence salmon in 1990.

Approximately 300 households have been identified in the Bering Sea coast communities of Mekoryuk, Newtok, Nightmute, Toksook Bay, and Tununak. Because house-to-house surveys were not conducted in these communities, data was obtained only by catch calendars and postcard surveys. Overall, 21 households in this region provided information. Of those households reporting, 71% harvested salmon for subsistence use in 1990. Cheforak was not included in the study.

Throughout the Kuskokwim Area, approximately 16% (248) of the 1,547 subsistence salmon calendars which were mailed pre-season were used and returned. In addition, there were responses to about 26% (302) of the 1,138 postcard surveys which were mailed to Kuskokwim Area households who had not returned harvest calendars or were not surveyed.

1990 Harvest Summary

Sample information and harvest estimates by community and fishing area are presented in Table 4. The 1990 subsistence harvest estimates for the Kuskokwim Area are 77,329 chinook, 32,217 sockeye, 108,556 chum, and 44,519 coho salmon. Reported salmon harvests account for 83.2% of the estimated chinook salmon harvest; 86% of the sockeye salmon harvest; 82.8% of the chum salmon harvest; and 75.3% of the coho salmon harvest.

Chum and chinook salmon were the primary species harvested (in number of salmon) for subsistence use. In all regions of the Kuskokwim Area, except the southern Kuskokwim Bay region, more chum salmon were harvested than any other species. In the southern Kuskokwim Bay region, chinook salmon was the primary species harvested (Table 6). Chinook salmon ranked second in the Lower and Middle Kuskokwim River regions; sockeye ranked second in the Upper Kuskokwim River and Bering Sea coast regions; and in the southern Kuskokwim Bay region coho salmon ranked second (Table 6).

Households in the Lower Kuskokwim region harvested 77.0% of the total estimated chinook salmon catch, 64.8% of the sockeye, 67% of the chum, and 71.7% of the coho. Two-thirds (66.2%) of the identified fishing households reside in this area (Table 3).

Average household harvests varied. Household harvests of chinook salmon were highest in the Lower Kuskokwim River (71.2) and the Kuskokwim Bay (50.5) regions. Average household harvest of chinook was lowest in the Upper Kuskokwim River region (28.5) (Table 4).

Average household chum salmon harvests were highest in the Lower Kuskokwim (86.9) and Upper Kuskokwim River regions (86.7). Household averages of sockeye was greatest (42.2) in the Upper Kuskokwim River region while the largest average harvest of coho (43.3) was in the southern Kuskokwim Bay region (Table 4).

Analysis on the types gear used to harvest subsistence salmon and salmon harvested as food for dogs in 1990 was not available at the time this report was prepared. A more detailed description of the 1990 Kuskokwim Area subsistence salmon fishery is available from the Division of Subsistence (Coffing and Utermohle in prep).

COMMERCIAL FISHERY

The commercial fishery expanded during the last ten years. This expansion is due to improved in-season management, increased participation by individual fishermen and improvements in fishing gear, tendering, and processing capabilities. In 1990, for the second year in a row, a record 824 of the 832 permit holders made at least one landing (Appendix A.2). Kuskokwim Area residents owned 814 of the permits that made landings (Table 5). Permit holders transfer freely between districts. Fishing time, fishing area, and gear restrictions maintain adequate subsistence harvests and average spawning escapements by offsetting increases in fishing effort and efficiency.

Weekly fishing periods are established by emergency order in all Kuskokwim districts. Only set and drift gill nets with six-inch or less mesh may be used for commercial salmon fishing. The nets may not exceed 50 fathoms in length or 45 meshes in depth (ADF&G 1990). The Board of Fisheries eliminated the district harvest guidelines in 1990. District 1 and 2 are managed by 5 AAC 07.365, Kuskokwim River Salmon Management Plan (ADF&G 1990). District 4 is managed by 5 AAC 07.367, District 4 Salmon Management Plan (ADF&G 1990). Goodnews Bay does not have a regulatory management plan and is managed by a Department plan that is revised and published annually.

The total 1990 Kuskokwim Area commercial salmon catches (District 1, 2, 4 and 5) consisted of 80,848 chinook, 204,374 sockeye, 445,062 coho, 17,560 pink and 522,535 chum salmon (Table 6). The total amount paid to fishermen was \$4,895,070, excluding bonuses and other incentives (Table 7). This is \$231,983 less than the previous ten year average. Below average prices for all species, except sockeye and pink salmon, were responsible for the low value of the sixth largest catch (Appendix A.3 & A.7). Coho salmon were the most valuable species bringing fishermen 1.8 million dollars (Table 7). Chum salmon were the most abundant species in the catch and the third most valuable (Table 7). In 1989 the average Kuskokwim permit holder earned \$5,941 (Appendix A.2).

ENFORCEMENT

The Working Group and other members of the public continued to express their concern over the growing enforcement problems in the commercial salmon fishery. Fishing before and after fishing periods, fishing in closed waters, and fishing without a permit are the greatest concerns. About 50 citations were issued in the Kuskokwim Area for salmon violations in 1990. Annual records are not available but it is believed this is the largest number ever issued in a single season. The increase was primarily due to increased effort on the part of Fish and Wildlife Protection who worked the area's commercial fishery with a special "Delta Force" in 1990. The largest number (-26) were closed period violations. Four fishermen were cited for fishing without a permit. The remainder were assorted violations such as subsistence fishing in a closed period, tenders without 12 inch numbers, crew members without licenses, and other miscellaneous violations.

Kuskokwim River

The JOINT STATEMENT ON THE MANAGEMENT OF THE KUSKOKWIM RIVER SALMON FISHERY and the Kuskokwim River Salmon Management Plan, SAAC 07.365, along with other regulations and policies promulgated by the Board of Fisheries provide the framework for management of the Kuskokwim River commercial salmon fishery (ADF&G 1990). Fishing periods in District 1 and 2 are usually six hours in duration, from 1:00 p.m. until 7:00 p.m. (ADF&G 1990). If the fishing periods are longer, the extra time is divided before 1:00 p.m. and after 7:00 p.m. (ADF&G 1990). The original plan, in effect in 1988-89, required that the time be equally divided before 1:00 p.m. and after 7:00 p.m. The requirement to divide equally was dropped when the plan was amended in 1989 by the Board at the recommendation of the Working Group. This amendment allowed a longer period to be announced in 1990 without a one day delay, that would have been required by the 24 hour notice period for subsistence fishermen, since the extra time could be added by a latter closing.

The Working Group continued to work closely with the Department in 1990. Through uncommon dedication by all the concerned parties (there were 28 meetings in 1990) the Working Group provided in-season management recommendations that helped accomplish management objectives (Table 8). The Working Group dealt with all fishing periods individually, recommending one period at a time so that any unexpected changes in run strength could be dealt with. This strategy provided good harvests and escapements for most species.

After reviewing the data on 15 June the Department recommended that the fishery open for 6 hours on 19 June. The Working Group felt that the chinook salmon catch would be too great that early and recommended that the fishery open on 20 June in District 1, downstream of Bethel (Stat. Area 335-11 & 12, Figure 2) in compliance with 5 AAC 07.365. KUSKOKWIM RIVER SALMON MANAGEMENT PLAN. The Department agreed and announced the opening for 20 June.

The chum salmon catch was weak and the chinook salmon catch strong during the 20 June opening (Appendices B.2 & B.4). In an effort to conserve both chum and chinook salmon the group agreed on a five day separation and called the next period for 25 June. Chum catch continued to be weak and the group and Department continued to agree to periods separated by 3 to 5 days to conserve chum salmon for the remainder of the season (Table 2).

During the first week of July the commissioner received a petition from over 70 people in Atmautluak requesting that:

1. There be a fishing period on every Monday and Thursday.
2. That management be returned to the Department.
3. That special openings for just commercial fishermen with no other source of income be held.

The Working Group received copies of the petition and issued a position paper on why fishing periods were not twice a week on Mondays and Thursdays. The commissioner explained to the Atmautluak fishermen why their requests could not be granted and encouraged them to participate in the Working Group in a subsequent letter.

Following the opening on 14 July escapement projections from the Aniak Sonar and Kogrukluik Weir showed that chum salmon escapement objectives may not be reached. No further openings were recommended until coho salmon dominated in the river.

The test fisheries were similar to 1989 and the first opening occurred on 1 August (Appendix B.10). The coho catch was 23,500, far below the 99,000 catch that had occurred in 1989 (Appendix B.11). This evident weakness resulted in agreeing that the next opening should be 6 August (Table 8). Based on test fishing results and run timing District 2 reopened on 6 August since coho salmon would dominate the catch at that time (Table 9).

The catch of 61,50 coho was typical for that date but the CPUE was lower than normal (Appendix B.11). The chum salmon catch of 4,559 was the second largest on record for that date (Appendix B.4). Only the record chum salmon run in 1988 had produced a larger catch. The weaker run strength of the 1990 chum run combined with the large chum catches in August confirmed the lateness of the 1990 chum salmon run.

The Working Group recommended that the next period be in three days on 10 August based on the normal coho salmon catch. The weak catch in the first fishing period and the low CPUE in the second concerned the Department. The Working Group meeting followed the 6 August fishing period so closely that there had not been any test fishing. The possible lateness of the run, if the coho salmon were late like the chum salmon, supported a 10 August opening. A desire to have more information caused the Department to refuse to follow a Working Group recommendation for the first time in 3 years. Instead we insisted on another meeting on 9 August that would still allow a period to be set on 10 August.

Test fishing results in both test fisheries showed improvement and the Department recommended that the fishery open on 10 August per the Working Group's earlier recommendation. The Working Group also supported their original recommendation. The period on 10 August took 58,251 coho salmon (Table 2). This was the lowest catch on that date in the last five years except for 1988, which failed to reach coho salmon escapement objectives (Appendix B.11). The Eek test fishery was at record levels and the Bethel test fishery daily indexes had begun to hit very high levels. In 1987 a late coho salmon run had resulted in similar poor catches early in August. The 1990 chum salmon run had been late so perhaps the coho salmon run was late. The Department recommended a period on 14 August, after explaining further poor catches would require a reduction in fishing time since

they would show the run was not late as suspected. The Working Group recommended a period on 13 August, which the Department allowed (Table 8).

The coho salmon catch of 115,444 was the highest ever in a 6 hour period (Appendix B.11). The catch in District 2 was a near record and the CPUE of 43.67 was above the CPUE of 37 that results in achieving the escapement index (Figure 6). Before the period on 13 August there had been little or no previous years catch data for comparison in District 2. Because of their small harvest guideline the district had not opened until the second week of August in the past (Appendix B.16). The elimination of the harvest guideline resulted in earlier periods that were difficult to interpret.

The unusual distribution of the catch caused some concern since 80 percent came from statistical area 12 (Figure 2). This indicated that the run was very compact and perhaps weak. The other data caused us to believe that the run was late and strong. Previous late, strong runs compacted around the peak and supported intense fishing while still allowing escapement. The Department recommended a six hour period on 16 August. The Working Group felt that nine hours would be better in view of the run strength and the tides, since it would provide more fishermen the opportunity to fish an incoming tide. We agreed to a 9 hour period on 16 August.

The catch on 16 August in District 1 was 68,605, which was typical for that date (Appendix B.11). The catch in District 2 was low and only produced a CPUE of 14.6 (Table 9). The Eek test fishery continued to show the highest index in its three years of operation. The Bethel test fishery showed an average run. The project leader notified the Working Group that we felt there was a problem caused by shortening the net. A shorter net was necessary to reduce catches since it was culturally objectionable to release the fish and tenders were not available to handle the fish. Unfortunately, the shorter net was more efficient on a surface area basis, which caused inflated test fishing indexes. Escapement data from the Kogrukluk Weir was beginning to suggest a weak run but late run timing also could be responsible for the poor numbers. The uncertainty resulted in the Working Group deciding to meet again on 19 August when more data was available.

The Eek and Subsistence test fisheries showed record catch levels. The hoped for correction of the Eek test fishery was unavailable due to a serious medical problem suffered by the project leader. The Bethel test fishery continued to show an average run (Appendix B.9). The Kogrukluk weir was showing very poor coho salmon escapement. The Department recommended a six hour period on 21 August. There was much debate about the conflicting data and the weaknesses of some of the data. Primarily how representative was a single stock (Kogrukluk) of the entire drainage escapement. The Working Group recommended a six hour period on 20 August. The period was allowed on 20 August because the data was not clear and it was difficult to imagine that a run that had produced a record catch on the 13 August could be weak. In addition a period on 20 August would coincide with periods in District 4 and 5. These runs were also not showing strongly. Effort shifts were occurring and at least one fishermen had fished illegally in the Kuskokwim River then delivered the fish as District 4 catch when the openings were not coincidental. Coincidental openings would benefit conservation and enforcement.

The Working Group meeting on 22 August was contentious on the subject of the Department's opinion that escapement was poor. The poor CPUE of 23 in District 2 on 20 August (Table 9 and Figure 6) and the second worst escapement to date on record at the Kogrukluk weir caused this opinion. A motion to fish again on 23 August failed for lack of a second. A motion to fish on 24 August narrowly passed by a vote of 6 to 2 (consensus is not more than 1 dissenting vote when 7 or fewer members are present, consensus is not more than 2 dissenting votes when 8 or more members are present). The Department refused to issue an emergency order for an opening on 24 August for conservation reasons. A motion to fish on

The chum salmon catch was weak and the chinook salmon catch strong during the 20 June opening (Appendices B.2 & B.4). In an effort to conserve both chum and chinook salmon the group agreed on a five day separation and called the next period for 25 June. Chum catch continued to be weak and the group and Department continued to agree to periods separated by 3 to 5 days to conserve chum salmon for the remainder of the season (Table 2).

During the first week of July the commissioner received a petition from over 70 people in Atmautluak requesting that:

1. There be a fishing period on every Monday and Thursday.
2. That management be returned to the Department.
3. That special openings for just commercial fishermen with no other source of income be held.

The Working Group received copies of the petition and issued a position paper on why fishing periods were not twice a week on Mondays and Thursdays. The commissioner explained to the Atmautluak fishermen why their requests could not be granted and encouraged them to participate in the Working Group in a subsequent letter.

Following the opening on 14 July escapement projections from the Aniak Sonar and Kogrukluik Weir showed that chum salmon escapement objectives may not be reached. No further openings were recommended until coho salmon dominated in the river.

The test fisheries were similar to 1989 and the first opening occurred on 1 August (Appendix B.10). The coho catch was 23,500, far below the 99,000 catch that had occurred in 1989 (Appendix B.11). This evident weakness resulted in agreeing that the next opening should be 6 August (Table 8). Based on test fishing results and run timing District 2 reopened on 6 August since coho salmon would dominate the catch at that time (Table 9).

The catch of 61,50 coho was typical for that date but the CPUE was lower than normal (Appendix B.11). The chum salmon catch of 4,559 was the second largest on record for that date (Appendix B.4). Only the record chum salmon run in 1988 had produced a larger catch. The weaker run strength of the 1990 chum run combined with the large chum catches in August confirmed the lateness of the 1990 chum salmon run.

The Working Group recommended that the next period be in three days on 10 August based on the normal coho salmon catch. The weak catch in the first fishing period and the low CPUE in the second concerned the Department. The Working Group meeting followed the 6 August fishing period so closely that there had not been any test fishing. The possible lateness of the run, if the coho salmon were late like the chum salmon, supported a 10 August opening. A desire to have more information caused the Department to refuse to follow a Working Group recommendation for the first time in 3 years. Instead we insisted on another meeting on 9 August that would still allow a period to be set on 10 August.

Test fishing results in both test fisheries showed improvement and the Department recommended that the fishery open on 10 August per the Working Group's earlier recommendation. The Working Group also supported their original recommendation. The period on 10 August took 58,251 coho salmon (Table 2). This was the lowest catch on that date in the last five years except for 1988, which failed to reach coho salmon escapement objectives (Appendix B.11). The Eek test fishery was at record levels and the Bethel test fishery daily indexes had begun to hit very high levels. In 1987 a late coho salmon run had resulted in similar poor catches early in August. The 1990 chum salmon run had been late so perhaps the coho salmon run was late. The Department recommended a period on 14 August, after explaining further poor catches would require a reduction in fishing time since

they would show the run was not late as suspected. The Working Group recommended a period on 13 August, which the Department allowed (Table 8).

The coho salmon catch of 115,444 was the highest ever in a 6 hour period (Appendix B.11). The catch in District 2 was a near record and the CPUE of 43.67 was above the CPUE of 37 that results in achieving the escapement index (Figure 6). Before the period on 13 August there had been little or no previous years catch data for comparison in District 2. Because of their small harvest guideline the district had not opened until the second week of August in the past (Appendix B.16). The elimination of the harvest guideline resulted in earlier periods that were difficult to interpret.

The unusual distribution of the catch caused some concern since 80 percent came from statistical area 12 (Figure 2). This indicated that the run was very compact and perhaps weak. The other data caused us to believe that the run was late and strong. Previous late, strong runs compacted around the peak and supported intense fishing while still allowing escapement. The Department recommended a six hour period on 16 August. The Working Group felt that nine hours would be better in view of the run strength and the tides, since it would provide more fishermen the opportunity to fish an incoming tide. We agreed to a 9 hour period on 16 August.

The catch on 16 August in District 1 was 68,605, which was typical for that date (Appendix B.11). The catch in District 2 was low and only produced a CPUE of 14.6 (Table 9). The Eek test fishery continued to show the highest index in its three years of operation. The Bethel test fishery showed an average run. The project leader notified the Working Group that we felt there was a problem caused by shortening the net. A shorter net was necessary to reduce catches since it was culturally objectionable to release the fish and tenders were not available to handle the fish. Unfortunately, the shorter net was more efficient on a surface area basis, which caused inflated test fishing indexes. Escapement data from the Kogrukluk Weir was beginning to suggest a weak run but late run timing also could be responsible for the poor numbers. The uncertainty resulted in the Working Group deciding to meet again on 19 August when more data was available.

The Eek and Subsistence test fisheries showed record catch levels. The hoped for correction of the Eek test fishery was unavailable due to a serious medical problem suffered by the project leader. The Bethel test fishery continued to show an average run (Appendix B.9). The Kogrukluk weir was showing very poor coho salmon escapement. The Department recommended a six hour period on 21 August. There was much debate about the conflicting data and the weaknesses of some of the data. Primarily how representative was a single stock (Kogrukluk) of the entire drainage escapement. The Working Group recommended a six hour period on 20 August. The period was allowed on 20 August because the data was not clear and it was difficult to imagine that a run that had produced a record catch on the 13 August could be weak. In addition a period on 20 August would coincide with periods in District 4 and 5. These runs were also not showing strongly. Effort shifts were occurring and at least one fishermen had fished illegally in the Kuskokwim River then delivered the fish as District 4 catch when the openings were not coincidental. Coincidental openings would benefit conservation and enforcement.

The Working Group meeting on 22 August was contentious on the subject of the Department's opinion that escapement was poor. The poor CPUE of 23 in District 2 on 20 August (Table 9 and Figure 6) and the second worst escapement to date on record at the Kogrukluk weir caused this opinion. A motion to fish again on 23 August failed for lack of a second. A motion to fish on 24 August narrowly passed by a vote of 6 to 2 (consensus is not more than 1 dissenting vote when 7 or fewer members are present, consensus is not more than 2 dissenting votes when 8 or more members are present). The Department refused to issue an emergency order for an opening on 24 August for conservation reasons. A motion to fish on

25 August failed by a vote of 3 to 4. A motion for a period on 27 August passed. The Department implemented this motion.

The commercial catch was poor in both districts on 27 August (Tables 2 and 8). The Eek test fishery continued to be at record levels while the Bethel test fishery showed an average run (Appendix B.9). Subsistence fishing had virtually ended so there was no current data from the Subsistence test fishery. The weir count continued to be the second worst on record. The Working Group choose to meet again on 30 August (Table 8).

The condition of the run had not changed and the Department recommended on 30 August that the Working Group announce the season closure by regulation on 1 September (Table 8). A motion recommending a period on 31 August passed. The Department refused to issue the emergency order for conservation reasons and the season closed by regulation on 1 September.

Chinook Salmon

The combined commercial and subsistence chinook salmon harvest has increased from an average of 56,000 fish for the 10 year period 1960-1969 to 96,000 during 1980-1989 (Appendix B.17). A commercial harvest target of 30,000 to 40,000 was in effect from 1973-1984 to stabilize catches until the result of such a harvest could be evaluated. Experience showed that the 30,000 to 40,000 harvest range was too high during weaker runs. In 1984 the Board of Fisheries reduced the range to 17-32,000 chinook salmon. The 1985 chinook salmon catch of 37,889 exceeded the harvest guideline while escapements were 25 to 43 percent of the desired objectives. The catch remained within the harvest guideline in 1986 and chinook salmon escapements were still 28 to 32 percent of the objectives.

Beginning in 1987 the commercial chinook fishery became incidental to the chum salmon fishery. To protect the escapement and subsistence requirement the Board imposed a chinook cap in 1987 and harvest guidelines in 1988 and 1989. In 1989 the Board increased the upper end of the incidental harvest guideline to 50,000 chinook. Most systems achieved chinook salmon escapement objectives since 1987 as a result of the major changes in the management plan to conserve chinook salmon. Harvests exceeding the harvest guideline also occurred during this period, suggesting that an increase in run size was primarily responsible for the increase in catch and escapement.

The six-inch mesh restriction has resulted in an improvement in quality of the escapement. The percent of females with gill net marks at the Kogrukluk weir has increased (Appendix B.18). This appears to show a higher net drop out rate among females. The commercial catch is showing an increase in the number of males and a decrease in the number of females. From 1982 - 1984 while using large mesh gear the commercial catch was 35 to 40 percent female. During the similar 1985 - 1987 period with the gear restrictions the commercial catch was 23 to 35 percent female. The gear change may be responsible for the increased chinook salmon harvest since the commercial fishery is now targeting the smaller male fish that escape the large mesh subsistence nets. The increase in net marked females has not resulted in a corresponding improvement in the sex ratio at the weir. Our hypothesis is that this is a result of the continued use of large mesh in the subsistence fishery combined with the increase in the subsistence harvest. This combination of gear types is fully utilizing all age classes of chinook salmon. The commercial and subsistence catch (Appendix B.17) combined with the escapement index (Figure 7) shows that the chinook salmon run is being fully exploited.

The incidental chinook salmon catch was 53,504 in 1990, well above the average of 38,910 (Appendix B.5). For the third time since 1981 chinook salmon reached escapement objectives in most index streams (Figure 7). An increase in the run size over recent years contributed to the improvement in catch and escapement. The Kwethluk River is one of several lower Kuskokwim spawning tributaries that

have not achieved escapement objectives in recent years in spite of the drainage index reaching objective level. The Kwethluk River reached its objective of 1,000 chinook for the second time in a row since 1979.

The incidental catch was the second largest chinook salmon catch in the history of the river and exceeded the harvest guideline of 50,000. This was inadvertent. To preserve chum salmon and remain in the chinook salmon harvest guideline only three 6 hour fishing periods occurred in June (Table 2). This is a violation of 5 AAC 07.365. KUSKOKWIM RIVER SALMON MANAGEMENT PLAN. (4) "there must be at least three eight hour fishing periods in June." The total catch at the end of June was 42,790 chinook salmon. Even though there were only three fishing periods in July the strength of the chinook salmon run carried the incidental catch over the harvest guideline.

Sockeye Salmon

The sockeye salmon catch is incidental to the chum salmon fishery in Districts 1 and 2. Since the 1981 season, fishermen, processors and the Department have worked together to identify each species in the commercial harvest. Sockeye salmon have comprised 5 to 33 percent of the chum-sockeye salmon catch since 1981. In 1990 the commercial harvest was 84,415 sockeye salmon, which was 15 percent of the chum-sockeye salmon catch (Table 6).

The sockeye salmon catch is incidental to the chum salmon fishery in the Kuskokwim River Districts. The 1990 catch of 84,415 was above the previous ten year average of 67,277 sockeye salmon (Appendix B.5). Sockeye salmon management is incidental to other species in the Kuskokwim River and there are no escapement objectives. The Kogrukluk weir escapement estimate of 8,406 sockeye salmon in 1990 is the third largest on record and above the 2,000 sockeye salmon average (Appendix A.4).

Chum Salmon

Before 1971, the chinook and coho salmon fisheries took chum salmon incidentally. Expansion of the commercial chum salmon fishery began in 1971, when it was apparent that a moderate increase in the chum salmon catch would be biologically sound. Based upon past subsistence harvest estimates (1924-1943 levels, Appendix A.3), a combined commercial and subsistence chum salmon harvest of 400,000 appeared to be consistent with the reproductive potential of the run. A combined catch of 400,000 chum salmon was the management goal during the early 1970's. Subsistence catches for the entire river have declined steadily since the inception of the commercial fishery in 1971 (Appendix A.3). This appears to be due to the decline in the use of dog teams for transportation, not the increased commercial harvest.

The commercial chum salmon harvest for the Kuskokwim River (Districts 1 and 2) has averaged 508,550 salmon in the last ten years (Appendix B.5). The commercial harvest strategy in-season is:

1. Test fishing catches showing adequate escapement of chum salmon.
2. Commercial catch per unit effort is similar to previous years when escapement objectives were reached.
3. Subsistence fishermen report adequate subsistence catches.
4. Chum salmon escapement projects showing adequate escapements.

Declining run strength normally results in a 2 to 3 week closure beginning in early to mid-July. Before 1985, only the lower half of District 1 was open to

commercial fishing during the chum salmon fishery. The Board instructed the Department to use the entire length of District 1 beginning in 1985. This increased the efficiency of the fleet and resulted in low chum escapements in 1986 and 1987. The 1988 boundary change added 16 miles to District 1. The new 1990 boundary shortened the district by about 8 miles. Record runs in 1988 and 1989 helped overcome this problem but still more time between fishing periods than the traditional Monday-Thursday schedule was needed achieve escapement objectives. The 1990 return was smaller but spacing the periods every 4 to 6 days resulted in approaching or achieving chum salmon escapement objectives.

Escapement objectives were approached or achieved from 1981-1984. Chum salmon escapement objectives were not achieved in 1985 through 1987. Escapement objectives were achieved in 1988 through 1990.

Effort in number of fishing permits has ranged from 176 in 1972 to 736 in 1990 in District 1 (Appendix B.20). Effort in number of fishing permits has ranged from 11 in 1981 to 54 in 1977 in District 2 (Appendix B.21).

The 1990 chum salmon catch of 460,112 fish was below the previous ten year average of 508,550 (Appendix B.5). Aniak Sonar exceeded the objective of 250,000 with an escapement estimate of 300,000. The Kogrukluk Weir fell short 3,000 fish with 27,000 fish. Smoke and weather restricted aerial surveys. Generally the completed surveys found chum salmon populations below objective levels. All indications are that the chum salmon run was 5 to 10 days late. A second series of aerial surveys were not possible due to weather. Given the lateness of the run and the results at the other escapement projects the later surveys probably would have shown escapements closer to objective level. The less frequent periods and early closure of the fishery appeared to be successful in achieving or approaching escapement objectives.

Fishermen harvested 13,816 chum salmon in District 2 in 1990 (Table 9). The first opening on 29 June had allowed the chinook salmon to pass through District 2 and concentrate the harvest on chum salmon. District 2 received identical fishing time as District 1 once chum salmon were the dominate species.

Coho Salmon

The Kuskokwim River reopens when coho salmon predominate in the subsistence and test fisheries. An assessment of run strength, as shown by test fishing, subsistence and commercial catches, and the escapement trend at the Kogrukluk weir determines the amount of fishing time. The test fisheries and escapement data from the weir have allowed a more timely assessment of run strength and an increased coho salmon catch.

In recent years catches have ranged from 200,000 to 660,000 coho salmon (Appendix B.5). Districts 1 and 2 close by regulation on 1 September. A strong run in 1984 and a late run in 1989 resulted in extending the season into September.

Since statehood the commercial coho salmon catches for the entire river have ranged from 2,498 in 1960 to 660,000 fish in 1986 (Appendix B.5). The recent ten year average (1980-1989) is 410,000 fish. Effort in number of fishing permits has ranged from 83 in 1971 to 714 in 1990 in District 1 (Appendix B.20). Effort in number of fishing permits has ranged from 9 in 1983 to 35 in 1986 in District 2 (Appendix B.21).

The subsistence fishery takes few coho salmon due to poor drying conditions during August and September. Earlier migrating species normally provide subsistence needs. This pattern has been changing gradually as the number of families with freezers increases. Coho salmon are the preferred species for freezing, accounting in part for the increased documented subsistence use of coho

salmon during the last five years. In addition, the Department has emphasized collection of subsistence coho salmon catch data in recent years.

The Kuskokwim River has two coho salmon escapement indexes. The Kogrukluk River weir operates through the coho salmon migration. This program has been successful in most years since 1981, although high water has caused incomplete counts or no count (Appendix A.4). The other index of escapement used is the CPUE of commercial fishermen in District 2. Effort has been stable in this district during the coho salmon fishery. Based 80 to 90 percent of Kuskokwim drainage suitable for spawning lies upstream of District 2. The majority of coho salmon spawners must pass through District 2. Figure 6 shows that in years when the CPUE in District 2 is greater than 37, the weir reaches the escapement objective. Since 1983 (establishment of objectives) they have been achieved in four of the seven years.

Since 1979 - 80 the even year coho salmon runs have been larger than the odd year runs. The 1990 catch was expected to follow this trend and be above average (Appendix B.5). Instead it was an average catch of 409,000 with poor escapements. The Kogrukluk River weir washed out before the 30 September closing date. The weir did operate through the peak and the projected escapement based on previous years run timing was 8,406, the worst on record (Appendix B.4). The accumulative CPUE in District 2 of 12 was the second lowest on record suggesting that escapement was poor throughout the drainage not just in the single system with a weir (Figure 6).

Pink Salmon

Pink salmon harvest is incidental to the chum and coho salmon fishery in the Kuskokwim River. Pink salmon have a strong odd - even year cycle in the Kuskokwim River and 3,365 pink salmon was below average even year catch (Appendix B.5). There is no pink salmon escapement program for the Kuskokwim River.

Roe Sales

The 1989 season was the first year that a processor registered to buy only roe in the Kuskokwim Area since the sale of subsistence roe was outlawed. No processors registered to buy only roe in 1990. The only roe sales were by catcher-sellers who sold their fish in local markets and their roe to processors.

Quinhagak, District 4, All Salmon Species

The Quinhagak District is in Kuskokwim Bay about 25 miles south of the Kuskokwim River (Figure 1). Commercial fishing occurs only in the marine waters of Kuskokwim Bay (Figure 4). This restriction is necessary to ensure adequate escapement of salmon up the narrow Kanektok and Arolik Rivers. The fishery consists of fishing drift gill nets in tidal channels radiating out into Kuskokwim Bay from the mouths of the streams in the district.

Whenever possible coincidental openings were held with other districts. When other districts were not open there were transfers of permit holders from these districts. Effort peaked at 218 on 18 June and remained above average until mid-July (Table 10). A record 390 permit holders participated in the fishery in 1990 (Appendix C.9).

Coincidental openings in Districts 4 and 5 were difficult because of the difference in the length of the subsistence closures in Districts 1 and 2. District 1 has a 16 hour closure before each period while the other districts have 24 hour closures. (District 2 has a 24 hour closure due to the tabling of subsistence proposals in 1989. Since the Board had passed a new management plan

requiring that Districts 1 and 2 be managed concurrently, the subsistence closure in District 2 was shortened to 16 hours by emergency order to comply with Board intent. Periods in the other districts were announced before the Working Group and Department decided the next period in the river to give subsistence fishermen adequate time to pull their nets. If the announcement was delayed to insure a coincidental opening, then an emergency order shortening the subsistence closure would be issued. Fish and Wildlife Protection and the District Attorney's office informed us that this creates enforcement problems since subsistence fishing times are not normally subject to short notice emergency orders.

Aerial surveys are the only in-season measure of escapement in District 4. Management is based on historical commercial catch levels and aerial surveys.

District 4 opened on 14 June in compliance with 5 AAC 07.367. DISTRICT 4 SALMON MANAGEMENT PLAN which requires an opening before 16 June. Chinook salmon catches were normal so fishing time remained on the normal two 12 hour periods per week schedule (Table 10). Until 25 June when chinook salmon catches had been below average for three periods in a row (Appendix C.8). The expected period on 28 June was not allowed to increase chinook salmon escapement since the run appeared weak. The chinook catch on 2 July was above average but sockeye salmon outnumbered the chinook salmon and the management emphasis switched to sockeye salmon.

Chinook salmon commercial catches in the past ten years have ranged from a peak of 46,000 chinook salmon in 1983 to a low of 10,000 in 1980. The most recent 10 year average commercial chinook salmon harvest in this district is 25,100 (Appendix C.7.). Chinook salmon escapement has reached the objective in the last ten years except 1986, 1987 and 1990 (Appendix C.2).

The total chinook catch in District 4 was 27,644 in 1990, which was above the previous 10 year average of 25,100 (Appendix C.7). Chinook salmon were the second most valuable species in the district producing \$251,303 for the fishermen (Table 7). The aerial survey index of 2,500 chinook salmon was below the escapement objective of 5,800 (Table 11).

On 02 July sockeye salmon outnumbered chinook salmon and sockeye salmon management began per 5 AAC 07.367. DISTRICT 4 SALMON MANAGEMENT PLAN. Sockeye salmon catches were well above average and fishing time increased to three 12 hour periods per week in early July (Table 10). An aerial survey on 16 July estimated an escapement of 32,080 sockeye, above the escapement objective of 15,000 (Table 11). Fishing time increased to a 36 hour period and then to three 24 hour periods a week. Period catches were record highs for this time period. The sockeye salmon catch of 83,600 is five times the previous 10 year average (Appendix C.7).

With the exception of 1983, sockeye salmon escapement has been at or above escapement objective since 1980 (Appendix C.2). In 1990, the peak survey of 32,082 on 16 July exceeded the new escapement objective of 15,000 sockeye salmon.

The chum salmon catch is incidental to the chinook and sockeye salmon fishery in District 4. The 1990 chum salmon catch of 47,700 was well above the previous 10 year average of 35,300 (Appendix C.7). The escapement index was 2,475 chum salmon, well below the escapement objective of 30,500 (Appendix C.2). The extra fishing time to harvest the large sockeye salmon run resulted in the lowest chum salmon escapement ever recorded.

Coho salmon dominated the catch beginning with the 6 August fishing period. Fishing resumed a three 12 hour periods per week schedule. Coho salmon catches were volatile throughout the season. Ranging from average to below average but no clear trend developed (Appendix C.10). Weather prevented escapement surveys and sport fishermen reported good catches. In the past, this schedule has allowed adequate escapement and so was continued. There were no buyers present

for the last 3 periods in this district. The season closed by regulation on 8 September.

The coho salmon catch of 26,900 was below the previous 10 year average of 60,240 (Appendix C.7.). Weather and water conditions prevented escapement surveys. Coho salmon were the third most valuable fish in the Quinhagak District bringing fishermen \$123,815 (Table 7).

Commercial coho salmon harvests in District 4 have ranged from 27,000 to 135,000 fish recently (Appendix C.7.). Intermittent aerial escapement surveys, along with commercial catch data provide the only in-season assessment of run strength. Normally, three (Monday, Wednesday, Friday) 12-hour (0900 to 2100 hours) commercial fishing periods per week allow adequate spawning escapements and subsistence harvests. Inclement weather often disrupts the fishing effort in District 4 during the coho salmon return. The three period per week schedule usually compensates for any fishing time "lost" due to weather. District 4 closes by regulation on 8 September.

The stock status of coho salmon is difficult to determine as aerial surveys are the only form of escapement monitoring presently in the district. Aerial surveys are often impossible due to adverse weather conditions in late August and September.

The pink salmon catch is incidental to the sockeye and coho salmon fishery in District 4. The 1990 catch of 12,000 was below the previous 10 year average of 18,000 (Appendix C.7.).

Goodnews Bay, District 5, All Salmon Species

Commercial salmon fishing began in 1968 in Goodnews Bay (Figure 5). Commercial fishermen primarily drift gill nets in tidal channels radiating from the Goodnews River, while a few fish with set nets. Chinook, sockeye, and chum salmon migration timing overlap in Goodnews Bay.

Since 1981, a counting tower on the middle fork of the Goodnews River has been used to estimate salmon escapement. The primary objective of the project is to provide daily escapement information to improve management of the commercial salmon fishery in Goodnews Bay. Chinook, sockeye, and chum salmon are migrating during the time the tower is in operation. The project terminates prior to migration of coho and pink salmon. Data collected at the tower also allows for comparison with aerial survey escapement data collected in the Goodnews River drainage.

Goodnews Bay opened on 20 June 1990. Fishing periods were coincidental with openings in the other districts whenever possible. Coincidental openings were successful in limiting large scale effort transfers. The period with the highest effort was on 29 June when District 4 closed and transfers resulted in 58 boats fishing in District 5. Usually fishing effort ranges from 35-45 permit holders (Table 12).

District 5 normally opens between 11 and 20 June depending on the entry pattern of chinook salmon into the Goodnews River. The district is managed for sockeye salmon with a special emphasis on protection of chinook salmon from over harvest. The small stock size of chinook salmon and the increased fleet efficiency has caused special concern for chinook salmon. Waiting until the earlier migrating chinook salmon begin entering the river helps prevent an overharvest during the sockeye salmon fishery. The normal amount of fishing time when chinook salmon are in the district is two 12-hour periods per week. The commercial chinook salmon harvest averages about 6,000 fish (Appendix D.5).

The chinook salmon catch of 3,303 fish in 1990 was below the previous 10 year average of 6,153 (Appendix D.5). The tower count of 3,636 was above the objective

of 3,000 chinook salmon. This is the first time since 1984 that the objective was reached (Appendix D.3).

Chinook salmon abundance has been decreasing since the peak commercial harvest of 14,117 chinook salmon in 1983 (Appendix D.5). The escapement objective was reached in 1990 by delaying the commercial opening. This allowed the earlier running chinook salmon to escape while still allowing the second largest sockeye salmon harvest on record.

Sockeye salmon are the target species in District 5 in June and July. The catch of 35,800 exceeds the previous 10 year average of 25,000 (Appendix D.5). Fishermen received \$263,500 for the sockeye catch (Table 7). In-season escapement counts indicated that the escapement objective would be achieved at the tower. Fishing time was increased to three 12 hour periods per week in July when the chinook salmon run ended. Beginning on 20 July fishing time was increased to three 24 hour periods per week when the escapement objective for sockeye salmon was reached at the tower (Appendix D.3).

The chum salmon catch is incidental to the sockeye salmon fishery in District 5. The 1990 catch of 13,194 is below the previous ten year average of 14,200 (Appendix D.5). The tower count of 6,400 chum salmon was below the objective of 15,000. Like District 4, harvesting the strong sockeye salmon run in District 5 resulted in the lowest chum salmon escapement ever recorded (Appendix D.3).

Sockeye and chum salmon escapements have approached or exceeded escapement objectives since 1983, excluding 1985 and 1988 when both species were below the objectives. Estimations of exploitation rate appear to be low for sockeye salmon (Appendix D.3). A review of the five years of total run size estimates for sockeye salmon resulted in lowering the escapement objective from 25,000 - 35,000 to 20,000 - 30,000. The next cycle will provide spawner - return data that will allow further refinements of the escapement objective.

On 1 August, sockeye salmon were still the dominant species but the coho salmon catch was increasing (Table 12). A schedule of three 12 hour periods per week began on 8 August when coho salmon dominated the catch. After the 13 August catch it became apparent that the coho salmon run was weak (Table 12 and Appendix D.11). Since there are no escapement projects, fishing was limited to one period a week to allow adequate escapement and determine run strength. The coho salmon commercial catch continued to be below average even with the reduction in fishing time. This resulted in the lowest coho catch on record. There were no processors present to buy fish the last two openings. This district closed by regulation on 8 September.

The 1990 coho salmon catch of 7,788 is the lowest catch since 1973 and well below the 10 year average of 32,000 (Appendix D.5). Weather prevented any coho salmon surveys by the Department. The US Fish and Wildlife Service did get a survey that found 1,951 coho salmon in the Goodnews River and 893 coho salmon in the Middle Fork. These surveys are well below the average of 15,000 and 2,000. However the USFWS survey was the latest ever conducted and so is not comparable to the existing data base.

The pink salmon catch of 629 is also well below the 10 year average of 2,795 (Appendix D.5). Pink salmon are more abundant in even years but in 1990 the catch was much lower than expected.

OUTLOOK FOR 1991

The Department is in the process of developing a program that will allow forecasting salmon returns in the Kuskokwim Area. Only broad range harvest

projections are possible. Brood year escapements and recent harvest trends are the basis for the harvest projections.

Chinook Salmon

Chinook salmon return to the Kuskokwim Area primarily as age 4, 5, and 6 fish. The brood years for 1991 will be 1985 through 1987.

Quinhagak (District 4) has the only directed chinook salmon fishery in the area. Chinook salmon escapement indexes were below objective levels in the Kanektok River in two of the three brood years. Harvest trends for recent years are stable except for the weak 1988 catch. An average harvest of 14,000 to 34,000 chinook should occur in 1990 (Table 13).

Goodnews River chinook salmon were below the escapement objectives in all three brood years. The recent years' harvest trend has been below average. The harvest 1990 should be below average to average in size. The incidental catch probably will be 2,700 to 14,100 chinook salmon (Table 13).

The combined chinook salmon harvest in Kuskokwim Bay (Districts 4 & 5) should be 16,000 to 42,000 fish (Table 13). The weak escapements may result in the catch being on the lower end of the scale.

Chinook salmon escapements were below objective levels in all three of the brood years in the Kuskokwim River drainage (Figure 7). The larger runs of 1987 through 1990 show improved survival for several of the contributing year classes. This should result in an incidental chinook harvest similar to that of the last six year range of 19,000 to 56,000 (Table 13).

Sockeye Salmon

Quinhagak and Goodnews Bay (District 5) are the only fisheries in the Kuskokwim Area that target on sockeye salmon. Most sockeye salmon return at five years of age in the Kuskokwim Area.

The 1986 brood year escapement index in the Kanektok River was 15,000 sockeye salmon exactly the objective of 15,000. Recent years' harvests vary radically from record highs to near record lows (Appendix C.7). The 1990 catch should be 6,500 to 83,700 sockeye salmon in District 4.

The 1986 brood year escapement index was 51,069 in the Goodnews River. This was above the objective of 20,000 to 30,000. This should result in a harvest of 6,700 to 36,000 sockeye salmon in District 5. The combined sockeye salmon harvest in Kuskokwim Bay (Districts 4 & 5) should be 13,000 to 120,000 fish (Table 13).

The sockeye salmon catch in the Kuskokwim River is incidental to the chum salmon fishery. The 1990 incidental catch should be 41,000 to 137,000 sockeye salmon (Table 13).

Chum Salmon

Chum salmon return to the Kuskokwim Area primarily as 4 and 5 year old fish. The Kuskokwim River fishery targets on chum salmon. The chum salmon catch is incidental in Districts 4 and 5.

Escapement indexes in the Kuskokwim River in the 1986 and 1987 parent years were below objective levels. The record chum salmon runs in 1988 and 1989, returned

to normal in 1990. An average chum salmon run in 1991 should result in a harvest of 200,000 to 1,380,000 (Table 13). The catch of chum salmon should be between 8,500 and 39,000 in District 4 and from 5,000 to 33,000 in District 5 (Table 13).

Coho Salmon

Coho salmon return primarily as 4 year old fish in the Kuskokwim Area. The only coho salmon escapement index is the Kogrukluk River weir in the Kuskokwim drainage. There is very little information on which to base coho salmon abundance.

The parent year (1987) escapement in the Kogrukluk River of 24,238 matched the objective of 25,000. The catch in 1987 in District 2 resulted in a CPUE of 40 showing average escapement through out the upper river. Based on the 1987 and 1989 runs, the trend for odd numbered year coho salmon runs to increase is continuing (Appendix B.5). An average run in 1991 should produce a catch of 220,000 to 660,000 coho salmon (Table 13).

In Districts 4 and 5, past years catches are the only guide to the coho salmon catch in 1991. In the last five years coho catches have ranged from 30,000 to 61,000 in District 4 and from 16,500 to 32,000 in District 5. The 1991 catches should be within these ranges (Table 13).

FRESHWATER FIN FISH FISHERY

Several species other than salmon, herring, and halibut are used for commercial, subsistence, and recreation purposes in the Kuskokwim Area. They are inconnu or sheefish (Stenodus leucichtys), whitefish (Coregonus spp. and Prosopium sp), char (Salvelinus sp), rainbow trout (Oncorhynchus mykiss), burbot (Lota lota), Arctic grayling (Thymallus arcticus), northern pike (Esox lucius), Arctic lamprey (Lamperta japonica), rainbow smelt (Osmerus mordax), blackfish (Dallia pectoralis) and longnose sucker (Catostomus) (Appendix A.9). The Division of Sport Fish documents the recreational fisheries.

Subsistence Fishery

Miscellaneous fin fish are taken by seine, set and drift gill nets, fish traps, dip nets, "jigging" through the ice and rod and reel. Subsistence catches taken during the winter are usually stored frozen. Human consumption is the primary use but dog food is a significant use. No regulations limit the number of these miscellaneous species taken for subsistence. There is no funding to monitor this harvest.

Commercial Fishery

The commercial fishery has been sporadic, primarily harvesting whitefish and burbot for local markets. Most of the whitefish harvest occurs incidentally to the salmon fishery.

The regulations require, besides the permit requirements of the Commercial Fisheries Entry Commission, a permit from the Department to conduct commercial fisheries on whitefish, sheefish, char, trout, pike, smelt, burbot, and lamprey. Those species may also be taken incidentally to commercial salmon fishing. There were eleven freshwater permits issued in 1989 for the Kuskokwim Area. This was the largest number of permits ever issued (Appendix F.1). The guidelines for permits are:

1. All waters of the area are open, except for the Johnson River drainage, to commercial freshwater fin fishing. The heavy subsistence utilization of those species in the Johnson River drainage is the reason for its closure to commercial fishing.
2. Whitefish, cisco, smelt, pike, burbot, and lamprey may be taken. Sheefish, char, and trout may not be taken due to their small population, low reproductive rates, and their heavy utilization in the subsistence fishery.
3. All legal commercial gear types are allowed.
4. Gill nets must be greater than 5 inches stretch mesh. Long lines and set lines must use hooks with a gap between point and shank larger than 3/4 inch.

These restrictions minimize the incidental catch of grayling, trout, char and other forbidden species and the catch of whitefish, burbot, and pike is predominantly of older age fish that have spawned at least once.

Appendix F.1 presents the freshwater fin fish fishery catches and value since 1977. The record effort level resulted in the third highest harvest on record of whitefish. By weight the catch was the fourth largest but it was the highest value harvest ever bringing fishermen \$5,166.

An estimated 2,000 pounds of whitefish were taken illegally from Whitefish Lake near Aniak. The first 1,000 pounds were sold using a salmon permit to a local store and these fish are included in the total catch figure. The second 1,000 pounds was offered for sale at several locations but since the fishermen was improperly licensed no sales occurred. The final disposition of these fish is unknown. Local residents were disturbed at the large harvest from Whitefish Lake which is heavily utilized for subsistence. They requested that the Department close the lake to further commercial fishing. No commercial permits will be issued for Whitefish Lake however none have ever been requested.

Status of the Stocks

The Department does not monitor the status of the freshwater species in the Kuskokwim Area. Limited Department observations, advisory committee recommendations and fishermen interviews give no indication of declining populations in most drainage.

MISCELLANEOUS SALTWATER FINFISH

An "undocumented commercial" fishery on Saffron or "Tom Cod" has occurred in the Kuskokwim Area for some time. These fish were surplus to subsistence needs and fishermen and local stores were (often still are) unaware of the regulatory requirements. The Department has been trying to inform buyers and sellers of these requirements. Since 1988 we have had information on the sale of fish exported from the coastal villages to Bethel. Sales within the villages are still undocumented. The available data on this fishery is reported in Appendix G.1.

PART II. INTRODUCTION: HERRING FISHERY

Area and District Boundaries

There are five commercial gill net sac roe districts and a subsistence herring fishery in the Kuskokwim Area. The Security Cove District includes all waters between the latitude of Cape Newenham and the latitude of the Salmon River (Figure 8). The Goodnews Bay District includes the waters of Goodnews Bay inside the north and south spits at the mouth and a line between the Ukfigag and Tunulik Rivers. The Cape Avinof District (Figure 9) consists of all waters landward of Kikegtek, Pingurbek and Kwigluk Islands from the longitude of Ishkowik River ($162^{\circ} 44'$ W. long) to the longitude of the Ursukfak River ($164^{\circ} 11'$ W. long). The Nelson Island District consists of all waters north of Chinigyak Cape and east of Atrnak Point, and all waters north of Talurarevuk Point and south of the southernmost tip of Chinit Point and east of $165^{\circ} 30'$ W. long., and all waters north of the northernmost tip of Chinit Point and south of Kigigak Island and east of $165^{\circ} 30'$ W. long. (Figure 10). The Nelson Island district boundary at Atrnak Point creates some confusion since the USGS maps transposed Atrnak and Uluruk Points. As a result the fishermen know Atrnak as Uluruk and Uluruk as Atrnak, which requires some explanation every year. The Nunivak Island District includes all waters extending three miles seaward of mean low water along the northern and east sides of Nunivak Islands from Kikoojit Rocks ($60^{\circ} 19' 30''$ N. lat., $166^{\circ} 56' 30''$ W. long.) to the small bay approximately two miles east of Ingrirak Hill ($60^{\circ} 17' 25''$ N. lat., $166^{\circ} 26' 55''$ W. long.) (Figure 11).

Management Programs

The Security Cove and Goodnews Bay commercial herring fisheries are managed under the Bering Sea Herring Fishery Management Plan which sets the maximum exploitation rate at 20% of the estimated spawning biomass. The Department attempts to harvest stocks in good condition (large volume, increasing abundance, good recruitment) at the upper end of the range (15-20%). Stocks in poor condition (small volume, decreasing abundance, poor recruitment) are exploited at lower than maximum rates (0-15%). The Alaska Board of Fisheries has directed the Department to manage the commercial herring fisheries in the Nelson Island, Nunivak Island and Cape Avinof Districts for an exploitation rate not to exceed 15% of the estimated available biomass. To provide additional protection for the subsistence herring harvest in the Nelson Island District, the following guidelines have been established by the Board of Fisheries:

1. The commercial fishery will be allowed to take up to 15% of the herring biomass, compared to up to 20% for most other fisheries having stocks of similar size and condition.
2. The commercial fishing season will be opened when a biomass of 2,500 tons or spawning activity is documented.
3. Periodic closures of the commercial fishery will be scheduled, during which time only subsistence fishing will be allowed.
4. Several important subsistence use areas occur throughout the district (e.g. waters north of Cape Vancouver) and specific areas may be closed to commercial fishing to insure the adequacy of subsistence harvests.

5. The Department will use all available means, including input from local residents, to insure the adequacy of subsistence herring harvests during the commercial fishing season.

Season Summary

The total Kuskokwim Area Pacific herring harvest for 1990 was approximately 739 tons with a total estimated value to the fishermen of approximately \$443,000 (Appendix H.1). The only food/bait fishery in this area occurs during the sac-ro-e fishery when the roe content is below the processors' acceptable minimums. Food/bait sales are a smaller portion of the harvest. Food/bait sales totaled 89 tons, while the sac roe harvest was 650 tons.

Fishing effort, measured in number of fishermen who made deliveries, decreased from 1989 levels by 50% in the Security Cove, 9% in the Goodnews Bay and 31% in the Cape Avinof District (Appendix H.3.). Average percent roe recovery from sac-ro-e quality herring ranged from 12.2 in the Goodnews Bay District to 8.8 in the Security Cove District. Percent harvest of estimated herring biomass ranged from 0 in the Nelson and Nunivak Islands Districts to 17.7 in the Goodnews Bay District (Appendix H.1).

The 1990 total estimated herring spawning biomass of 10,374 tons for the surveyed portion of the Kuskokwim Area herring districts was 10% lower than the 1989 estimate (Appendix H.1). Ages 8 and older herring comprised 65% of the total run. Younger age fish (ages 3, 4, and 5) accounted for only 5% of the total biomass (Table 14).

In 1990, the Nelson and Nunivak Island Districts were given limited entry status by the Commercial Fisheries Entry Commissions. Entry permits were issued to qualified applicants who had fished in these fisheries before 1 January 1988.

STOCK STATUS

Assessment Methods

Aerial surveys were flown throughout the Pacific herring spawning season in all Kuskokwim Area commercial fishing districts to determine relative abundance, distribution, and biomass of herring. Occurrence and extent of milt, numbers of fishing vessels, and visibility features affecting survey quality were also recorded. Data collection methods were similar to those used since 1978. Approximately 38 hours were spent conducting aerial surveys in the Kuskokwim Area: 11 hours in Security Cove and Goodnews Bay, 7 hours in the Central Kuskokwim Bay area, 10 hours in Nelson Island and 10 hours in Nunivak Island. Weather and sea conditions were fair in all but the Cape Avinof District, where high winds and turbidity hampered survey coverage.

Standard conversions of 1.52 st/538 ft² (water depths of 16 ft (ft) or less), 2.58 st/538 ft² (water depths between 16 and 26 ft) and 2.83 st/538 ft² (water depths greater than 26 ft) were used to convert estimated herring school surface areas to biomass within all districts.

Test fishing with variable mesh gill nets occurred in all districts to determine age, sex, size and sexual maturity of herring and to note occurrence of other schooling fishes. Commercial landings were sampled in the Security Cove, Goodnews Bay and Cape Avinof fishing districts. Age composition of herring collected from the Department test fishery and the commercial catch is summarized, by district, in Table 15. Additionally, volunteer gill net vessels

collected herring samples within all districts. This information allows interpretation and modification of aerial survey biomass data.

Ground surveys conducted in some districts provide information on the distribution and density of eel grass beds and herring spawn deposition.

Spawning Populations

Security Cove District

A total of 6 aerial surveys was flown on 6 days during the 1990 season, from 9 May to 31 May. Herring schools were first observed in the district on 9 May (369 tons). Total biomass (2,650 tons) was determined by combining the 1,561 tons of herring seen on 10 May and the 1,089 tons observed on 31 May. A total of 4.0 linear miles of milt was observed in 2 spawn sightings during an aerial survey on 24 May.

The Security Cove test fish crew fished from 9 May to 17 May with variable mesh gill nets. The catch was 447 herring, all of which were sampled for age, sex, size and maturity. Age 8 and older herring comprised 74% of the test fish catch while 5 to 7 year old fish were 26% of the catch (Table 15).

Volunteer commercial fishermen collected herring samples from designated areas of the district which industry roe technicians evaluated for roe quality. This program allowed the openings to be timed to maximize roe production.

A sample of 277 herring from the commercial catch was 75% age 8 and older. Herring of age 5, 6, and 7 comprised 25% of the commercial catch (Figure 12). No age-4 or younger herring were found in the commercial catch sample.

Goodnews Bay District

Ten aerial surveys were flown on 10 days during the 1990 season, from 9 May to 31 May. The total biomass estimate of 2,577 tons was obtained by combining the 1,184 tons observed on 16 May with the 1,393 tons seen on 31 May. During aerial surveys a total of 0.5 linear miles of milt was observed on 12 May.

Test fishing occurred from 8 May to 26 May. The catch was 1,143 herring were sampled for age-sex-size data. Age 8 and older herring made up 60% while aged 4 - 7 fish were 40% of the test catch (Table 15).

Volunteer commercial fishermen collected herring samples from designated areas of the Bay which industry roe technicians evaluated for roe quality. This program allowed the openings to be timed to maximize roe production.

A sample of 548 herring from the commercial catch was 67% age 8 and older. Fish under age 8 were 33% of the catch (Table 15).

Cape Avinof District

Between 19 May and 1 June, 7 aerial surveys were flown in the Cape Avinof District. A peak biomass of 152 tons was seen on 22 May. No spawn was observed in the Cape Avinof District in 1990. All but two surveys were flown under unsatisfactory conditions, therefore total biomass for the district could not be determined.

The Department's test fishery captured 1,161 herring between 25 May and 13 June which were sampled for age-sex-size data. Age 6 herring were the predominant age class (28%) while only 27% of these fish were age 8 or older (Table 15).

Commercial fishermen brought in herring samples from various areas in the district for industry roe technicians to evaluate. This information was used to help determine the timing of fishing periods.

The commercial catch sample of 119 herring was 78% age 8 or older with ages 5 - 7 fish making up 22% of the catch (Table 15).

Nelson Island District

Fifteen aerial surveys were flown on 12 days from 20 May to 6 June during the 1990 season. The peak aerial survey biomass estimate of 2,705 tons was observed on 31 May. A total of 0.3 linear miles of milt was observed during an aerial survey on 22 May.

Test fishing with variable mesh gill nets occurred from 19 May - 22 June. The catch was 1,519 herring which were sampled for age, sex, size and maturity. Age 3 to 7 fish made up 49% of the test catch with the other 51% being age 8 or older herring (Table 15).

Volunteer commercial and subsistence fishermen under the supervision of the Department of Fish and Game conducted additional sampling of the Nelson Island herring stock.

Nunivak Island District

Seven aerial surveys were flown on 7 days between 21 May and 1 June during the 1990 season. Most surveys were made under excellent or good conditions. The peak aerial biomass estimate of 422 tons was made under good conditions on 28 May. A total of 7.2 linear miles of milt was observed while surveying with peak spawn seen on 22 May.

The Department test fishery captured 592 herring for age-sex-size data. Ninety-four percent of the herring were age 8 or older while recruit herring (ages 3 to 6) were less than 2% of the catch (Table 15).

SUBSISTENCE FISHERY

Subsistence fishing for Pacific herring in the northeastern Bering Sea is very important in villages of the Yukon-Kuskokwim River delta. The subsistence fishery is conducted primarily by residents of the coastal villages of Kwigillingok, Kongiganak, Kipnuk, Cheforak, Toksook Bay, Umkumiut, Tununak, and Newtok. The herring stocks utilized by the subsistence fishery are the same ones targeted by the commercial fishery in the nearby commercial fishing districts.

Subsistence harvest surveys have occurred annually in Nelson Island villages since 1985 and sporadically in Kuskokwim delta villages since 1975. Average annual herring subsistence harvests have been at least 110 tons since 1975 (Appendix H.2). The 1990 subsistence survey of Nelson Island communities resulted in an estimated 126 tons of subsistence herring harvested. A survey of Nunivak Island residents estimated 4.5 tons of herring were taken for subsistence use. Subsistence survey results reflect harvest trends and reported catches represent minimum figures since not all fishermen are contacted and other Kuskokwim River delta villages were not surveyed.

During the surveys many Nelson Island villagers reported that the declining numbers of herring affected their subsistence activities (Pete, 1990). Several families did not fish for herring due to perceived declines in herring numbers and variable productivity. Herring were unusually variable in size and had higher than normal oil content. Subsistence users prefer herring with low oil content since they are less likely to spoil. Herring abundance dropped dramatically in mid-June, a time when the less oily herring are usually present. Time spent subsistence fishing increased in 1990 compared to previous years.

COMMERCIAL FISHERY

Security Cove District

The commercial herring fishery in the Security Cove District has opened and closed by emergency order since 1981 to provide for an orderly fishery and periodic reassessments of herring biomass. A four hour fishing period on 12 May and a three hour period on 13 May were needed to harvest 233.6 tons (Table 16).

During the 12 May opening, fishermen harvested 125 tons of sac roe herring with an average roe percentage of 8.8% and 39 tons of bait-quality herring. During the 3 hour opening on 13 May 49 tons of sac roe herring with a average roe content of 8.4% and 21 tons of bait-quality herring were harvested.

The sac roe quality herring had an average roe recovery of 8.7%. Value of the harvest was about \$94 thousand (Appendix H.1). Average price was \$500 per ton for 10% roe recovery, with an increase or decrease of \$50 per ton for each percentage point above or below 10%.

Nine processors purchased herring in Security Cove (Appendix H.3.). A total of 52 fishermen made 77 deliveries in the 1990 fishery. Kuskokwim Area residents did not make landings in the Security Cove herring fishery during the 1990 season.

The commercial exploitation rate of Pacific herring was 8.8% of the estimated available biomass (Appendix H.3). Ages 8 and older Pacific herring comprised 79% of the total harvest. There were no herring under age 5 in the commercial catch sample.

A Fish and Wildlife Protection helicopter, C-185 aircraft and the P/V Wolstad was present in the Security Cove District during the opening. Several minor fishing violations were reported.

Goodnews Bay District

Since 1981, to provide for an orderly fishery and periodic reassessments of herring biomass, commercial herring fishing in Goodnews Bay has opened and closed by emergency order. A total of 454.6 tons were taken during 32 hours of fishing in 6 periods (Table 16).

Beach meetings with fishermen occurred to monitor the quality of the herring in Goodnews Bay. Samples were brought in by volunteer fishermen and analyzed by industry roe technicians.

The first commercial opening on 18 May, from 1430 to 1630, produced a harvest of 5.9 tons (4.6 tons sac-roe and 1.3 ton bait). Only 56 fishermen made landings in this period. The district was reopened for eight hours at 1100 on 19 May and 79.4 tons were harvested (65.1 tons sac-roe and 14.3 tons bait). In this period, 87 fishermen made 104 landings with an average roe content of 10.7% for sac-roe quality fish. The district was reopened on 20 May for eight hours at 1200. A

total of 43.6 tons (43.2 tons sac-roë and 0.4 tons bait) was delivered by 67 fishermen and average roë content was 12.0%. Due to low catch rates and some observed wastage of herring, a fishermen's meeting was called for 21 May. Two openings were announced for 22 May, the first for 4 hours beginning at 0600 and a 5 hour opening starting at 1500. These openings had 110 fishermen delivering 181.2 tons (171.0 tons sac-roë and 10.2 tons bait) with 12.7% average roë content. The final opening was for 5 hours on 23 May beginning at 0600. Sac-roë herring catch amounted to 142.9 tons with average roë content of 12.4% and bait herring deliveries totaled 1.6 tons. Ninety fishermen made 101 landings in the last opening.

Sac roë herring accounted for 94% (427 tons) of the harvest. A few minor instances of wastage were observed. Average roë recovery for the season was 12.2%. The value of the catch to the fishermen was \$314 thousand (Appendix H.1). Average price was \$500 per ton for 10% roë recovery, with an increase or decrease of \$50 per ton for every percentage point above or below 10%. Three processors purchased Pacific herring (Appendix H.3.). Most processors established 7% as the minimum roë recovery required for sac roë quality herring. Herring of less than 7% roë recovery sold as bait and the price averaged \$50 per ton. A total of 126 fishermen made 530 deliveries in the 1990 fishery. Local fishermen (i.e. residents of Platinum, and Goodnews Bay) accounted for the majority of the harvest.

The exploitation rate of herring was 17.7% of estimated available biomass (Appendix H.1). Ages 8 and older herring comprised 74% of the total harvest. No age-4 or younger herring occurred in the harvest sample.

Management of the 1990 herring fishery in Goodnews Bay was without major problems. The Fish and Wildlife Protection vessel Woldstad patrolled the district during the season. Several fishing violations were reported.

Cape Avinof District

This was the third year that a commercial herring fishery occurred in the Cape Avinof District. As in all other Kuskokwim Bay districts, commercial herring fishing is regulated by emergency order. In November 1989, the Alaska Board of Fisheries moved the eastern boundary of the Cape Avinof District from Tsintulik Slough to the Ishkowiik River. This area was previously closed to commercial fishing at the request of local residents to prevent interference with the subsistence harvest. A total of 49.7 tons of herring were harvested during 3 hours of fishing time (Table 16).

Two commercial openings were scheduled in the Cape Avinof District. Fishermen harvested 10.1 tons during a one hour opening on 29 May. Because of this low harvest, the district was reopened the same day for two hours. The harvest from both openings was 49.1 tons of sac roë herring with an average roë content of 12.0% and 0.6 tons of bait-quality herring.

Only one tender was present in the district on 29 May. When the tender returned on June 4, commercial test fishing failed to find herring with acceptable roë quality due to the presence of young and spent fish. The district was closed to commercial fishing on 12 June since Department test fish samples showed poor roë quality and no processors were available.

One hundred-one fishermen made deliveries to one processor. Fishermen received approximately \$500 per ton for 10% sac roë herring. The value of the catch to fishermen was about \$35,000. Local fishermen (residents of Kipnuk, Kwigillingok, Kongiganak, Chaforak and Tuntutuliak) accounted for 87% of the harvest.

this declining biomass trend may precipitate reduced harvest levels or complete closure of some commercial fishing districts during the 1991 commercial fishing season. Reduced exploitation rates during 1991 will allow a harvest while protecting the declining populations.

Security Cove District

The commercial season opens when the biomass reaches 1,200 tons or spawning activity is observed. The occurrence and length of fishing periods depends on stock strength, fishing effort, and spawning activity. The declining recruitment of younger age fish into the population requires a 15% exploitation rate for the Security Cove herring stock in 1991. The 1991 projected return is 1,490 tons which at a 15% exploitation rate would result in a harvest of about 224 tons (Table 17). A larger catch may occur if the 1991 biomass assessment is greater than the projection.

Goodnews Bay District

Management strategy for this district will be similar to that used for Security Cove. The season will open and close by emergency order when a biomass of 1,200 tons is observed or spawning activity occurs. The 1991 projected return of herring to the Goodnews Bay District is 1,472 tons which at a 15% exploitation rate would result in a harvest of 221 tons (Table 17). A larger catch may occur if the 1991 biomass assessment is greater than the projection.

Cape Avinof District

Either spawning activity or a biomass of 500 tons must be observed before the commercial herring season can be opened. The season will open and close by emergency order. The projected 1991 biomass for the Cape Avinof area stock is 1,708 tons (Table 17). The Cape Avinof District's herring stocks appear to be showing a lack of recruitment similar to that seen in all southwestern Alaska herring fisheries. The 15% exploitation rate will take into account the limited data base for this area and insure recognition of the subsistence fishing priority. Assuming a 15% commercial exploitation rate, the projected harvest would be 256 tons of herring. With an additional estimated 30 tons of subsistence herring harvest, total exploitation rate in 1991 would be 17%.

Nelson Island District

In the Bering Sea Herring Fishery Management Plan the Alaska Board of Fisheries set minimum biomass levels that would allow a commercial herring fishery in the Nelson and Nunivak Island Districts. The minimum biomass level is 2,500 tons in the Nelson Island District and 1,500 tons in the Nunivak Island District. The in-season estimate of herring biomass must exceed the threshold level before a commercial fishery can be allowed.

The peak biomass estimate for the Nelson Island District was 2,705 tons in 1990 (Appendix H.1). Over 50% of the herring were age 9 or older while 5% of the herring were recruits (ages 3, 4 and 5). The spawning biomass projected to return to the Nelson Island District in 1991 is 1,897 tons (Table 17), which is lower than the threshold biomass needed to have a commercial fishery. This decline is primarily due to the high mortality rates of older age herring. The projected decline in biomass and the importance of protecting the herring stock for the subsistence fishery is the reason for closure of the fishery if the biomass threshold is not exceeded. If the in-season biomass estimate is greater than 2,500 st, a commercial fishery will be allowed. If the estimated biomass is less than 2,800 tons the exploitation rate in the commercial fishery will be

under 10 percent. The harvest level will not exceed 10% unless available biomass greatly exceeds the threshold biomass.

Nunivak Island District

The peak biomass estimate for the Nunivak Island District was 422 tons in 1990 (Appendix H.1). Over 90% of the herring were ages 9 or older and less than 1% were recruit herring. The projected biomass of herring returning to the Nunivak Island District in 1991 is 235 tons (Table 17). This is lower than the 1,500 tons threshold biomass level necessary to allow a commercial fishery. This decline is due to the high mortality rates of older age herring. If the in-season biomass estimate is greater than 1,500 st, a commercial fishery will be allowed. If the estimated biomass is less than 1,700 tons the exploitation rate in the commercial fishery will be under 10 percent. The harvest level will not exceed 10 percent of the estimated biomass unless available biomass greatly exceeds the threshold biomass.

LITERATURE CITED

- Alaska Department of Fish and Game. 1961. Kuskokwim River Salmon Tagging Studies, 1961. Kuskokwim Salmon Stock Separation Reports No. 1. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau.
- Alaska Department of Fish and Game. 1962. Kuskokwim River Salmon Tagging Studies, 1962. Kuskokwim Salmon Stock Separation Reports No. 2. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau.
- Alaska Department of Fish and Game. 1966. Kuskokwim River Salmon Tagging Studies, 1966. Kuskokwim Salmon Stock Separation Reports No. 3. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau.
- Alaska Department of Fish and Game A. 1990. 1990-1991 Arctic-Yukon-Kuskokwim Region Commercial and Subsistence Fishing Regulations Salmon and Miscellaneous Finfish. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau.
- Alaska Department of Fish and Game. 1990 B. 1990 Commercial Herring Fishing Regulations. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau.
- Anderson, C. A. In press. Abundance, Age, and Size of Salmon (Oncorhynchus spp.) Catches and Escapements in the Kuskokwim Area, 1987. Alaska Department of Fish and Game, Commercial Fisheries, Juneau.
- Bill, Donald L.; Russell, Richard B.; Skrade, Jeffrey R.; Bucher, Wesley A.; Fried, Stephen M.; Bue, Brian; Cross, Beverly A.; Rowell, Katherine A. 1989. Annual Management Report -1988- Bristol Bay Area. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 4D89-09, Anchorage.
- Hamner, Helen. 1986. Migratory Timing of Coho Salmon in the Kuskokwim Area, 1979-1984. Kuskokwim Salmon Escapement Report No. 46. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau.
- Coffing, M. and Utermohle, C. In Prep. Subsistence Salmon Harvests in Kuskokwim Area in 1990. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 204, Juneau.
- Huttunen, Daniel C. 1984. Abundance, Age, and Size of Salmon (Oncorhynchus spp.) Catches and Escapements in the Kuskokwim Area, 1982. Alaska Department of Fish and Game, Commercial Fisheries, Technical Data Report No. 111, Juneau.
- Huttunen, D.C. 1984. 1982-1983 Kuskokwim River Test Fishing Projects. AYK Region, Kuskokwim River Salmon Test Fishing Report No. 13. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau.
- Huttunen, D.C. 1984. 1984 Kanaktok River Sonar Project Report, 1984. Alaska Department of Fish and Game, Division of Commercial Fisheries, AYK Region Kuskokwim Escapement Report. Anchorage.
- Huttunen, D.C. 1985. Abundance, Age, and Size of Salmon (Oncorhynchus spp.) Catches and Escapements in the Kuskokwim Area, 1983. Alaska Department of Fish and Game, Commercial Fisheries, Technical Data Report No. 133, Juneau.

LITERATURE CITED (Continued)

- Huttunen, D.C. 1985. Kuskokwim River Salmon Test Fishing, 1984. AYK Region, Kuskokwim River Salmon Test Fishing Report No. 15. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau.
- Huttunen, D.C. 1986. 1986 Kanektok River Sonar Project Report, 1986. Alaska Department of Fish and Game, Division of Commercial Fisheries, AYK Region Kuskokwim Escapement Report. Anchorage.
- Huttunen, D.C. 1986. Abundance, Age, and Size of Salmon (Oncorhynchus spp.) Catches and Escapements in the Kuskokwim Area, 1984. Alaska Department of Fish and Game, Commercial Fisheries, Technical Data Report No. 186, Juneau.
- Huttunen, D.C. 1986. Kuskokwim River Test Fishing Report, 1986. AYK Region, Kuskokwim River Salmon Test Fishing Report No. 16. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau.
- Huttunen, D.C. 1987. Abundance, Age, and Size of Salmon (Oncorhynchus spp.) Catches and Escapements in the Kuskokwim Area, 1985. Alaska Department of Fish and Game, Commercial Fisheries, Technical Data Report No. 212, Juneau.
- Huttunen, D.C. 1987. 1986 Kuskokwim River Salmon Abundance Estimation Based on Calibrated Test Fishing CPUE Data. AYK Region, Kuskokwim River Salmon Test Fishing Report No. 17. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau.
- Huttunen, D.C. 1987. Abundance, Age, Sex, and Size of Salmon (Oncorhynchus) Catches and Escapements in the Kuskokwim Area, 1985. ADF&G Technical Data Report No. 212. Alaska Department of Fish and Game, P.O. Box 3-2000, Juneau, Alaska 99802.
- Huttunen, D.C. 1989. Abundance, Age, and Size of Salmon (Oncorhynchus spp.) Catches and Escapements in the Kuskokwim Area, 1986. ADF&G Technical Fishery Report No. 89-21. Alaska Department of Fish and Game, Commercial Fisheries, Juneau.
- Jonrowe, Dee Dee A.S. and three coauthors. 1982. Annual Management Report 1981 Kuskokwim Area. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau.
- Pete, Mary C. 1990. Subsistence herring fishing in the Nelson Island and Nunivak Island Districts, 1990. ADF&G, Div. of Subsistence, Fairbanks.
- Schneiderhan, D.J. 1982. 1982 Aniak River sonar studies. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 26, Anchorage.
- Schneiderhan, D.J. 1982a. 1982 Salmon River Weir studies. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 29, Anchorage.
- Schneiderhan, D.J. 1984. 1982 Ignatti Weir study. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 30, Anchorage.
- Schneiderhan, D.J. 1984a. 1983 Ignatti Weir study. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 31, Anchorage.

LITERATURE CITED (Continued)

- Schneiderhan, D.J. 1984b. 1983 Aniak River Sonar study. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 32, Anchorage.
- Schneiderhan, D.J. 1985. Salmon escapement study, Kogrukluk River weir, 1984. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 35, Anchorage.
- Schneiderhan, D.J. 1985. 1984 Aniak River salmon escapement study. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Escapement Report No. 36, Anchorage.
- Schneiderhan, D.J. 1988. Kogrukluk Weir Salmon Escapement Study 1985-1987. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A88-16, Anchorage.
- Schneiderhan, D.J. 1988a. Aniak River salmon escapement study, 1985-1987. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A88-17, Anchorage.
- Schneiderhan, D.J. 1988b. Kuskokwim Area salmon escapement observation catalog 1984-1988. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3B88-29, Anchorage.
- Schneiderhan, D.J. 1988c. Aniak River salmon escapement study, 1988. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A88-33, Anchorage.
- Schneiderhan, D.J. 1988. Kogrukluk Weir salmon escapement study 1988. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A89-09, Anchorage.
- Schultz, K. and Williams, Mark. 1984. Kanektok River Sonar Enumeration Project, 1983. Alaska Department of Fish and Game, Division of Commercial Fisheries, AYK Region Kuskokwim Escapement Report. Anchorage.

TABLES

Table 1 1990 Kuskokwim Area fish ticket summary.

<u>STAT AREA</u>	<u>DISTRICT NAME</u>	<u>BATCH RANGE</u>	<u>TICKET RANGE</u>	<u>TOTAL TICKETS</u>
335-10	Lower Kuskokwim (S)	101-148	700,001--708,597	8,597
335-20	Middle Kuskokwim (S)	201-205	720,001--720,169	169
335-40	Quinhagak (S)	401-419	730,001--733,382	3,382
335-50	Goodnews Bay (S)	501-513	740,001--740,912	912
335-49	Security Cove (H)	900,901,903	725,001--725,316	81
335-50	Goodnews Bay (H)	901,902,903,904	725,071--725,607	526
335-60	Nelson Island (H)	NO COMMERCIAL OPENINGS		
335-70	Nunivak Island (H)	NO COMMERCIAL OPENINGS		
335-80	Cape Avinof (H)	905	725,608--725,716	109

TOTAL SALMON		85 BATCHES		13,060 TICKETS
TOTAL HERRING		6 BATCHES		716 TICKETS

TOTAL FISH TICKETS		91 BATCHES		13,776 TICKETS

Table 2 Lower Kuskokwim River, District 1, commercial salmon harvest and fishing effort by period, 1990.

PERIOD DATE	HOURS	PERMITS	CHINOOK		SOCKEYE		COHO		PINK		CHUM	
			NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE
01 06/20-06/20	6	630	16,690	4.42	10,318	2.73					30,306	8.02
02 06/25-06/25	6	611	16,031	4.37	27,024	7.37					58,944	16.08
03 06/29-06/29	6	645	9,428	2.44	18,774	4.85					74,911	19.36
04 07/05-07/05	6	591	4,071	1.15	10,759	3.03			3		86,835	24.49
05 07/09-07/09	6	589	2,804	.79	8,757	2.48			11		91,411	25.87
06 07/14-07/14	8	625	2,127	.43	5,467	1.09	70	.01	32	.01	79,803	15.96
07 08/01-08/01	6	611	252	.07	533	.15	23,549	6.42	1,586	.43	9,065	2.47
08 08/06-08/06	6	631	306	.08	133	.04	61,450	16.23	976	.26	4,597	1.21
09 08/10-08/10	6	653	94	.02	66	.02	58,251	14.87	335	.09	1,269	.32
10 08/13-08/13	6	642	38	.01	48	.01	115,444	29.97	111	.03	509	.13
11 08/16-08/16	9	650	28		29		68,605	11.73	113	.02	239	.04
12 08/20-08/20	6	594	11		34	.01	51,838	14.54	38	.01	113	.03
13 08/27-08/27	6	534	3		16		16,030	5.00	21	.01	25	.01
TOTALS	83	743	51,883	.84	81,958	1.33	395,237	12.03	3,226	.08	438,027	7.10

TABLE 3 1990 KUSKOKWIM AREA SUBSISTENCE SALMON PROJECT SAMPLING SUMMARY

	Total House holds	<u>Calendars</u>		<u>Postcards</u>		<u>Surveyed</u>	<u>Phone Contact</u>	<u>Any Info</u>	<u>Subsistence Fished</u>
		<u>Mailed</u>	<u>Returned</u>	<u>Mailed</u>	<u>Returned</u>				
Kipnuk	96	3	0	29	6	1	0	7	4
Kwigillingok	33	1	0	1	0	0	0	0	0
Kongiganak	55	31	3	14	0	38	0	53	34
<u>North Kuskokwim</u>									
<u>Bay Totals</u>	184	35	3	44	6	39	0	60	38
Tuntutuliak	55	45	10	21	2	40	0	53	45
Eek	66	42	13	17	2	28	0	41	19
Kasigluk	79	62	9	21	4	61	0	73	58
Nunapitchuk	83	68	8	29	6	48	0	67	48
Atmautluak	53	29	1	24	6	32	0	41	31
Napaklak	73	49	13	21	2	51	0	58	40
Napaskiak	71	56	7	30	4	33	0	57	43
Oscarville	15	8	5	6	0	10	0	10	10
Bethel	1,215	377	349	524	171	88	87	592	289
Kwethluk	121	86	729	31	9	55	0	110	77
Akiachak	96	66	7	25	1	68	0	80	63
Aklak	56	44	10	12	1	39	0	49	33
Tuluksak	60	50	10	12	1	51	0	57	45
<u>Lower Kuskokwim</u>									
<u>Totals</u>	2,043	982	171	773	209	604	87	1,288	799
Lower Kalskag	66	53	9	23	3	41	0	60	41
Upper Kalskag	40	30	6	12	3	28	0	33	19
Aniak	161	128	16	43	13	94	0	146	97
Chuathbaluk	24	17	4	5	1	18	0	24	19
<u>Middle Kuskokwim</u>									
<u>Totals</u>	291	228	35	83	20	181	0	263	176
Crooked Creek	29	21	3	11	2	17	0	27	20
Red Devil	13	11	5	4	3	3	0	12	11
Sleetmute	32	22	6	9	4	19	0	32	20
Stony River	15	13	0	1	0	12	0	13	9
Lime Village	12	5	0	0	0	11	0	12	9
McGrath	147	38	1	39	32	61	0	140	34
Takotna	17	3	1	1	1	13	0	14	2
Nikolai	30	17	3	1	0	24	0	27	14
Telida	3	3	0	3	0	0	0	0	0
<u>Upper Kuskokwim</u>									
<u>Totals</u>	298	133	19	69	42	160	0	277	119
<u>KUSKOKWIM</u>									
<u>RIVER TOTALS¹</u>	<u>2,816</u>	<u>1,378</u>	<u>288</u>	<u>969</u>	<u>277</u>	<u>984</u>	<u>87</u>	<u>1,888</u>	<u>1,132</u>
Quinhagak	121	90	13	26	4	76	0	112	84
Goodnews Bay	65	34	4	13	1	41	0	42	23
Platinum	18	9	2	0	0	16	0	17	10
<u>South Kuskokwim</u>									
<u>Bay Totals</u>	204	133	19	39	5	133	0	171	117
Mekoryuk	50	19	0	27	6	0	0	6	6
Newtok	59	2	0	15	3	0	0	3	1
Nightmute	26	1	0	11	1	0	0	1	1
Toksook Bay	76	9	1	41	7	0	0	8	6
Tununak	86	5	0	36	3	0	0	3	1
<u>Bering Sea</u>									
<u>Coast Totals</u>	297	36	1	130	20	0	0	21	15
<u>KUSKOKWIM</u>									
<u>AREA TOTALS</u>	<u>3,317</u>	<u>1,547</u>	<u>248</u>	<u>1,138</u>	<u>302</u>	<u>1,117</u>	<u>87</u>	<u>2,080</u>	<u>1,264</u>

¹Includes North Kuskokwim Bay

TABLE 4 1990 KUSKOKWIM AREA SUBSISTENCE SALMON HARVESTS

	Total House holds	House- holds Cont'd	Chinook Reported Harvest	Chinook Est'd. Harvest	Chum Reported Harvest	Chum Est'd. Harvest	Sockeye Reported Harvest	Sockeye Est'd. Harvest	Coho Reported Harvest	Coho Est'd. Harvest
Kipnuk	96	4	108	108	540	540	175	175	460	460
Kwigillingok	33	0	0	0	0	0	0	0	0	0
Kongiganak	55	53	915	915	618	618	264	264	265	265
<u>North Kuskokwim</u>										
<u>Bay Totals</u>	184	57	1,023	1,023	1,158	1,158	439	439	725	725
Tuntutuliak	55	53	2,484	2,537	3,987	4,072	935	955	743	759
Eek	66	36	3,032	4,609	1,786	2,665	771	1,212	1,084	1,703
Kasigluk	79	73	2,776	2,869	2,538	2,623	708	732	879	908
Nunapitchuk	83	64	2,054	2,244	3,327	4,053	702	702	287	287
Atmautiak	53	41	1,794	2,067	2,841	3,168	967	1,121	281	322
Napakiak	73	57	2,576	3,413	5,845	6,538	1,001	1,070	1,021	1,506
Napaskiak	71	58	3,302	3,413	5,410	5,488	865	894	641	674
Oscarville	15	10	721	721	676	676	122	122	34	34
Bethel	1,215	578	10,534	18,248	10,986	16,852	3,629	5,892	9,981	18,126
Kwethluk	121	109	6,571	7,335	7,181	8,016	2,897	3,234	3,051	3,406
Akiachak	96	82	4,919	5,204	5,943	6,222	2,018	2,115	874	915
Akiak	56	49	4,012	4,177	6,033	6,227	1,342	1,393	1,715	1,715
Tuluksak	60	57	1,673	1,706	4,870	4,967	972	991	829	846
<u>Lower Kuskokwim</u>										
<u>Totals</u>	2,043	1,267	46,448	58,542	61,423	71,567	16,929	20,432	21,420	31,202
Lower Kalskag	66	60	2,463	2,515	3,561	3,637	648	662	662	676
Upper Kalskag	40	31	1,145	1,446	1,139	1,320	223	292	221	281
Aniak	181	150	3,023	3,075	6,077	6,175	1,166	1,194	1,069	1,094
Chuathbaluk	24	24	1,290	1,290	2,102	2,102	885	885	601	601
<u>Middle Kuskokwim</u>										
<u>Totals</u>	291	265	7,921	8,326	12,879	13,234	2,922	3,033	2,553	2,632
Crooked Creek	29	27	591	591	1,760	1,760	940	940	534	534
Red Devil	13	12	250	250	1,344	1,344	408	408	794	794
Sleetmute	32	32	597	597	1,574	1,574	890	890	859	859
Stony River	15	13	355	385	551	597	632	685	180	195
Lime Village	12	12	205	205	2,250	2,250	2,100	2,100	484	484
McGrath	147	135	686	688	1,818	1,833	0	0	1,495	1,512
Takotna	17	17	126	126	128	128	0	0	0	0
Nikolai	30	27	520	547	788	829	0	0	52	55
Telida	3	0	0	0	0	0	0	0	0	0
<u>Upper Kuskokwim</u>										
<u>Totals</u>	298	275	3,330	3,389	10,213	10,315	4,970	5,023	4,398	4,433
<u>KUSKOKWIM</u>										
<u>RIVER TOTALS</u>	<u>2,816</u>	<u>1,864</u>	<u>58,722</u>	<u>71,281</u>	<u>85,673</u>	<u>96,274</u>	<u>25,260</u>	<u>28,926</u>	<u>29,096</u>	<u>38,991</u>
Quinhagak	121	112	4,995	5,050	2,585	2,620	1,528	1,544	3,471	3,510
Goodnews Bay	65	27	379	682	190	342	503	905	818	1,472
Platinum	18	17	163	177	115	125	129	140	83	90
<u>South Kuskokwim</u>										
<u>Bay Totals</u>	204	156	5,537	5,909	2,890	3,087	2,160	2,589	4,372	5,072
Mekoryuk	50	6	0	0	1067	8892	50	417	52	433
Newtok	59	1	1	1	4	4	3	3	4	4
Nightmute	26	1	3	3	35	35	10	10	0	0
Toksook Bay	76	8	108	135	160	200	212	265	15	19
Tununak	86	1	0	0	65	65	7	7	0	0
<u>Bering Sea</u>										
<u>Coast Totals</u>	297	17	112	139	1,331	9,196	282	702	71	456
<u>KUSKOKWIM</u>										
<u>AREA TOTALS</u>	<u>3,317</u>	<u>2,037</u>	<u>64,371</u>	<u>77,329</u>	<u>89,894</u>	<u>108,556</u>	<u>27,702</u>	<u>32,217</u>	<u>33,539</u>	<u>44,519</u>

Table 5 Kuskokwim Area salmon entry permits issued by village, 1990.

VILLAGE	NUMBER OF ENTRY PERMITS
AKIACHAK	57
AKIAK	24
ANIAK	9
ATMAUTLUAK	27
BETHEL	164
CHAUTHBALUK	1
CHEFORNAK	4
EEK	37
GOODNEWS BAY	31
LOWER KALSKAG	4
UPPER KALSKAG	3
KASIGLUK	42
KIPNUK	15
KONGIGANAK	22
KWETHLUK	63
KWIGILLINGOK	16
MEKORYUK	1
MCGRATH	2
NAPAKIAK	43
NAPASKIAK	25
NUNAPITCHUK	46
OSCARVILLE	8
PLATINUM	6
QUINHAGAK	82
TULUKSAK	27
TUNTUTULIAK	45
KUSKOKWIM AREA SUBTOTAL	<u>814</u>
ANCHORAGE	9
DILLINGHAM	2
FAIRBANKS	3
MARSHALL	1
MANOKOTAK	2
TOGIAK	2
NON-LOCAL ALASKA RESIDENTS SUBTOTAL	<u>19</u>
SARANAC LAKE, N.Y.	1
NON-RESIDENT SUBTOTAL	<u>1</u>
TOTAL NUMBER OF PERMITS	<u>824</u>

Table 6 Kuskokwim Area commercial^a and subsistence salmon catches by species and district, 1990.

DISTRICT	Chinook	Sockeye	Coho	Pink	Chum	Total
District 1, Lower Kuskokwim River:						
Commercial	52,138	82,413	396,516	3,258	439,539	973,864
Subsistence	59,565	20,871	31,926	na	72,725	185,087
SUBTOTAL	111,703	103,284	428,442	3,258	512,264	1,158,951
District 2, Middle Kuskokwim River:						
Commercial	1,621	2,457	13,816	139	22,085	40,118
Subsistence	8,326	3,033	2,632	na	13,234	27,225
SUBTOTAL	9,947	5,490	16,448	139	35,319	67,343
Upper Kuskokwim River:						
Commercial	CLOSED TO COMMERCIAL SALMON FISHING					
Subsistence	3,389	5,023	4,433	na	10,315	23,160
SUBTOTAL						
Kuskokwim River:						
Commercial	53,759	84,870	410,332	3,397	461,624	1,013,982
Subsistence	71,280	28,927	38,991	na	96,274	235,472
SUBTOTAL	125,039	113,797	449,323	3,397	557,898	1,249,454
District 4, Quinhagak:						
Commercial	27,644	83,681	26,926	12,056	47,717	198,024
Subsistence	5,050	1,544	3,510	na	2,620	12,724
SUBTOTAL	32,694	85,225	30,436	12,056	50,337	210,748
District 5, Goodnews Bay:						
Commercial	3,303	35,823	7,804	629	13,194	60,753
Subsistence	859	1,045	1,562	na	467	3,933
SUBTOTAL	4,162	36,868	9,366	2,117	13,661	64,686
Kuskokwim Bay:						
Commercial	30,947	119,504	34,730	12,685	60,911	258,777
Subsistence	5,909	2,589	5,072	na	3,087	16,657
SUBTOTAL	36,856	122,093	39,802	14,173	63,998	276,922
Etolin Strait:						
Commercial	Closed to Commercial Fishing					
Subsistence	139	702	456	na	9,196	10,493
SUBTOTAL	139	702	456	na	9,196	10,493
Kuskokwim Area:						
Commercial	84,706	204,374	445,062	16,082	522,535	1,272,759
Subsistence	77,328	32,218	44,519	na	108,557	262,622
TOTAL	162,034	236,592	489,581	17,560	631,092	1,535,381

^a Includes salmon caught in the Kuskokwim test fish projects and sold to processors.

Table 7 1990 Kuskokwim Area commercial salmon fishery final calculated value by district and area.

	<u>CHINOOK</u>	<u>SOCKEYE</u>	<u>COHO</u>	<u>PINK</u>	<u>CHUM</u>	<u>DISTRICT TOTAL</u>
<u>LOWER KUSKOKWIM DISTRICT 1</u>						
TOTAL FISH	52,138	82,413	396,516	3,258	439,539	973,864
TOTAL POUNDS	736,594	589,833	2,563,801	11,256	3,022,589	6,924,073
TOTAL DOLLARS	\$419,859	\$601,630	\$1,589,557	\$1,801	\$785,872	\$3,398,719
AVERAGE WEIGHT	14.13	7.16	6.47	3.45	6.88	
<u>MIDDLE KUSKOKWIM DISTRICT 2</u>						
TOTAL FISH	1,621	2,457	13,816	139	22,085	40,118
TOTAL POUNDS	27,130	16,804	82,779	573	146,903	274,189
TOTAL DOLLARS	\$15,193	\$17,812	\$49,667	\$92	\$38,195	\$120,959
AVERAGE WEIGHT	16.74	6.84	5.99	4.12	6.65	
<u>QUINHAGAK DISTRICT 4</u>						
TOTAL FISH	27,644	83,681	26,926	12,056	47,717	198,024
TOTAL POUNDS	456,916	508,419	193,461	37,912	336,819	1,533,527
TOTAL DOLLARS	\$251,304	\$544,008	\$123,815	\$4,170	\$90,941	\$1,014,238
AVERAGE WEIGHT	16.53	6.08	7.18	3.14	7.06	
<u>GOODNEWS BAY DISTRICT 5</u>						
TOTAL FISH	3,303	35,823	7,804	629	13,194	60,753
TOTAL POUNDS	58,428	251,046	60,797	2,117	95,432	467,820
TOTAL DOLLARS	\$32,135	\$263,598	\$38,910	\$254	\$25,767	\$360,664
AVERAGE WEIGHT	17.69	7.01	7.79	3.37	7.23	
<u>TOTAL ALL DISTRICTS</u>						
TOTAL FISH	84,706	204,374	445,062	16,082	522,535	1,272,759
TOTAL POUNDS	1,279,068	1,366,102	2,900,838	51,858	3,601,743	9,199,609
TOTAL DOLLARS	\$718,491	\$1,427,048	\$1,801,949	\$6,317	\$940,775	\$4,894,580
AVERAGE WEIGHT	15.10	6.68	6.53	3.22	6.89	
AVERAGE PRICE/LB	\$0.56	\$1.05	\$0.75	\$0.12	\$0.26	
PRICE/FISH	\$8.46	\$7.01	\$4.89	\$0.38	\$1.79	
ROE SALES						\$490
GRAND TOTAL FOR AREA						\$4,895,070

Table 8 Executive summary of department and working group actions, 1990.

<u>DATE</u>	<u>DEPT. RECOMMENDATIONS</u>	<u>WORKING GROUP RECOMMENDATIONS</u>	<u>ACTUAL</u>
05-10			
05-24			
06-07			
06-15	District 1 on June 18 - 6 hours or 8 hours	District 1 on June 20 - 6 hours	District 1 on June 20
06-22	District 1 on June 25	District 1 on June 25 - 6 hours	District 1 on June 25 - 6 hours
06-26	Meet again on June 28	Meet again on June 28	Meet again on June 28
06-28	District 1 and 2 on June 30 - 6 hours	District 1 and 2 on June 29 - 6 hours	District 1 and 2 on June 29 - 6 hours
06-30	Meet again on July 2	Meet again on July 2	Meet again on July 2
07-02	District 1 and 2 on July 5 - 6 hours	District 1 and 2 on July 5 - 6 hours	District 1 and 2 on July 5 - 6 hours
07-06	Meet again on July 8	Meet again on July 8	Meet again on July 8
07-08	District 1 and 2 on July 10 - 6 hours	District 1 and 2 on July 9 - 6 hours	District 1 and 2 on July 9 - 6 hours
07-10	Meet again on July 12	Meet again on July 12	Meet again on July 12
07-12	District 1 and 2 on July 14 - 6 hours	District 1 and 2 on July 14 - 8 hours	District 1 and 2 on July 14 - 8 hours
07-16	Meet again on July 18	Meet again on July 18	Meet again on July 18
07-18	Meet again on July 20	Meet again on July 28	Meet again on July 28

Table 8 (page 2 of 2)

<u>DATE</u>	<u>DEPT. RECOMMENDATIONS</u>	<u>WORKING GROUP RECOMMENDATIONS</u>	<u>ACTUAL</u>
07-27	District 1 on August 1	District 1 on August 1 - 6 hours	District 1 on August 1 - 6 hours
07-30	Opening already set	Opening already set	Opening already set
08-02	None	Meet again on August 4	Meet again on August 4
08-04	District 1 and 2 on August 7 - 6 hours	District 1 and 2 on August 6 - 6 hours	District 1 and 2 on August 6 - 6 hours
08-07	Meet again on August 9	District 1 and 2 on August 10 - 6 hours	Meet again on August 9
08-09	District 1 and 2 on August 10 - 6 hours	District 1 and 2 on August 10 - 6 hours	District 1 and 2 on August 10 - 6 hours
08-12	District 1 and 2 on August 14 - 6 hours	District 1 and 2 on August 13 - 6 hours	District 1 and 2 on August 13 - 6 hours
08-15	District 1 and 2 on August 16 - 6 hours	District 1 and 2 on August 16 - 9 hours	District 1 and 2 on August 16 - 9 hours
08-17	Meet again on August 19	Meet again on August 19	Meet again on August 19
08-19	District 1 and 2 on August 21 - 6 hours	District 1 and 2 on August 20 - 6 hours	District 1 and 2 on August 20 - 6 hours
08-22	Meet again on August 24 or fish on August 27	Dist 1 & 2 on Aug 24 - 6 hours Dist 1 & 2 on Aug 27 - 6 hours	Rejected by Department Dist 1 & 2 on Aug 27 - 6 hours
08-28	Announce season closed or meet again	Meet again on August 30	Meet again on August 30
08-30	Announce close of season	District 1 and 2 on August 31 - 6 hours	Season closed

Table 9 Middle Kuskokwim River, District 2, commercial salmon harvest and fishing effort by period, 1990.

PERIOD	DATE	HOURS	PERMITS	LNDGS	CHINOOK		SOCKEYE		COHO		PINK		CHUM	
					NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE
01	06/29-06/29	6	14	16	641	7.63	735	8.75					3,838	45.69
02	07/05-07/05	6	15	17	467	5.19	561	6.23					4,397	48.86
03	07/09-07/09	6	17	18	255	2.50	580	5.69			8	.08	5,163	50.62
04	07/14-07/14	8	17	20	209	1.54	567	4.17			14	.10	6,999	51.46
05	08/06-08/06	6	15	15	21	.23	5	.06	1,111	12.34	56	.62	742	8.24
06	08/10-08/10	6	15	15	17	.19	5	.06	1,946	21.62	24	.27	550	6.11
07	08/13-08/13	6	16	16	4	.04	1	.01	4,192	43.67	20	.21	276	2.88
08	08/16-08/16	9	17	17	6	.04			2,239	14.63	10	.07	105	.69
09	08/20-08/20	6	18	18					2,548	23.59	5	.05	12	.11
10	08/27-08/27	6	17	17	1	.01	1	.03	1,780	17.45	2	.02	3	.03
TOTALS		65	22	169	1621	1.13	2457	1.72	22,085	15.44	139	.16	13,816	21.62

Table 10 Quinhagak, District 4, commercial salmon harvest and fishing effort by period, 1990.

PERIOD	DATE	HOURS	PERMITS	LNOGS	CHINOOK		SOCKEYE		COHO		PINK		CHUM	
					NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE
01	06/14-06/14	12	147	159	5,080	2.88	384	.22					2,125	1.20
02	06/18-06/18	12	218	244	4,726	1.81	462	.18					1,617	.62
03	06/21-06/21	12	110	145	4,493	3.40	1,039	.79					2,150	1.63
04	06/25-06/25	12	70	81	2,732	3.25	1,667	1.98			1		2,277	2.71
05	07/02-07/02	12	179	215	3,602	1.68	5,654	2.63			7		4,509	2.10
06	07/05-07/05	12	94	127	1,176	1.04	6,464	5.73			7	.01	4,168	3.70
07	07/07-07/07	12	198	229	1,497	.63	8,326	3.50			13	.01	4,827	2.03
08	07/09-07/09	12	84	122	798	.79	7,313	7.25	39	.04	19	.02	3,518	3.49
09	07/11-07/11	12	175	211	973	.46	7,672	3.65			18	.01	4,659	2.22
10	07/13-07/13	12	169	190	569	.28	10,755	5.30			66	.03	4,882	2.41
11	07/16-07/16	12	175	189	401	.19	8,537	4.07	1		185	.09	3,369	1.60
12	07/19-07/21	36	204	355	792	.11	12,850	1.75	11		2,489	.34	4,065	.55
13	07/23-07/24	24	169	218	240	.06	4,361	1.08	10		1,878	.46	1,690	.42
14	07/25-07/26	24	76	107	116	.06	2,681	1.47	98	.05	1,819	1.00	1,053	.58
15	07/27-07/28	24	72	94	104	.06	2,096	1.21	57	.03	1,907	1.10	787	.46
16	07/30-07/31	24	66	94	111	.07	1,516	.96	738	.47	1,632	1.03	802	.51
17	08/01-08/02	24	52	64	72	.06	757	.61	392	.31	800	.64	479	.38
18	08/03-08/03	12	37	43	41	.05	408	.53	592	.76	402	.52	250	.32
19	08/06-08/06	12	63	81	43	.03	254	.19	2,068	1.56	235	.18	181	.14
20	08/08-08/08	12	84	96	25	.01	198	.11	2,080	1.18	182	.10	136	.08
21	08/13-08/13	12	76	95	17	.01	89	.06	6,165	3.86	125	.08	95	.06
22	08/16-08/16	12	69	73	6		39	.03	3,203	2.21	59	.04	22	.02
23	08/18-08/18	12	53	55	7	.01	36	.03	1,008	.91	27	.02	9	.01
24	08/20-08/20	12	69	95	16	.01	42	.03	4,954	3.42	111	.08	27	.02
25	08/23-08/23	12	88	100	4		51	.03	3,964	2.15	53	.03	14	.01
26	08/25-08/25	12	1	1					115	5.48				
27	08/27-08/27	12	69	69	3		30	.02	1,431	.99	21	.01	6	
28	08/29-08/29	12	0											
29	09/05-09/05	12	0											
30	09/07-09/07	12	0											
TOTALS		456	390	3,552	27,644	.14	83,681	.43	47,717	.25	12,056	.31	26,926	.83

Table 11 Peak aerial survey salmon escapement estimates in Kuskokwim spawning tributaries by species, 1990^a.

<u>Location</u>	<u>Date</u>	<u>Chinook</u>	<u>Sockeye</u>	<u>Coho</u>	<u>Chum</u>
<u>KUSKOKWIM RIVER:</u>					
Aniak R.	19-Jul	1,307	0	na	25,580
Salmon R.	19-Jul	596	0	na	540
Kipchuk R.	19-Jul	537	0	na	455
Eek R.	20-Jul	2,811	0	na	2
Mdl. Fk. Eek R.	20-Jul	505	0	na	210
Holokuk R.	3-Aug	157	0	na	725
Kasigluk R.	18-Jul	0	0	na	200
Kisaralik R.	18-Jul	631	0	na	400
Kwethluk R.	20-Jul	1,200	0	na	5,458
Crooked Cr.	20-Jul	92	0	na	117
Oskawalik R.	3-Aug	113	0	na	1,340
Tuluksak R.	18-Jul	205	0	na	1,634
<u>KUSKOKWIM BAY:</u>					
Goodnews River ^b	2-Aug	696	28,981	30	1,196
	2-Oct	0	0	2,668	0
Kanektok River	16-Jul	2,726	32,082	na	2,475

- a Peak aerial salmon escapement index count. Aerial index counts do not represent total escapement, but reflect annual spawner abundance trends when made using standard survey methods under acceptable conditions.
- b Goodnews River and Middle Fork Goodnews River.

Table 12 Goodnews Bay, District 5, commercial salmon harvest and fishing effort by period, 1990.

				CHINOOK		SOCKEYE		COHO		PINK		CHUM	
PERIOD	DATE	HOURS	PERMITS	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE
01	06/20-06/20	12	23	358	1.30	383	1.39					433	1.57
02	06/25-06/25	12	29	340	.98	1,656	4.76					1,341	3.85
03	06/29-06/29	12	58	330	.47	3,323	4.77					1,235	1.77
04	07/02-07/02	12	40	710	1.48	8,198	17.08			2		2,232	4.65
05	07/05-07/05	12	21	557	2.21	2,052	8.14			5	.02	1,018	4.04
06	07/07-07/07	12	38	316	.69	3,026	6.64			4	.01	1,583	3.47
07	07/09-07/09	12	38	135	.30	3,141	6.89			5	.01	1,356	2.97
08	07/11-07/11	12	40	63	.13	2,664	5.55			5	.01	761	1.59
09	07/13-07/13	12	35	66	.16	2,046	4.87					896	2.13
10	07/16-07/16	12	43	54	.10	2,071	4.01	1		19	.04	623	1.21
11	07/18-07/18	12	46	59	.11	1,292	2.34			29	.05	558	1.01
12	07/20-07/21	24	37	84	.09	1,432	1.61	1		57	.06	479	.54
13	07/23-07/24	24	19	55	.12	829	1.82	2		56	.12	177	.39
14	07/25-07/26	24	14	44	.13	388	1.15	2	.01	29	.09	86	.26
15	07/27-07/28	24	14	24	.07	479	1.43	6	.02	111	.33	126	.38
16	07/30-07/31	24	20	35	.07	423	.88	47	.10	69	.14	124	.26
17	08/01-08/02	24	16	12	.03	441	1.15	67	.17	71	.18	57	.15
18	08/03-08/03	12	12	9	.04	348	1.38	70	.28	40	.16	28	.11
19	08/06-08/06	12	29	9	.01	498	.82	316	.52	31	.05	29	.05
20	08/08-08/08	12	28	9	.02	324	.55	357	.61	25	.04	20	.03
21	08/10-08/10	12	27	5	.01	260	.46	463	.82	24	.04	8	.01
22	08/13-08/13	12	27	15	.03	185	.33	673	1.19	20	.04	5	.01
23	08/16-08/16	12	7	1	.01	23	.16	462	3.14				
24	08/20-08/20	12	32	7	.01	98	.15	1,678	2.50	11	.02	11	.02
25	08/27-08/27	12	34	4	.01	148	.21	2,519	3.53	12	.02	5	.01
26	08/29-08/29	12	31	2		91	.14	1,124	1.73	4	.01	3	
28	09/07-09/07	12	1			4	.19	16	.76				
TOTALS			82	3303	.08	35,823	.90	7,804	1.23	629	.07	13,194	.33

Table 13 Preliminary projections of the 1991 Kuskokwim Area commercial salmon harvests in thousands of fish by species.

<u>Species</u>	<u>Management Region</u>		<u>Total</u>
	<u>Kuskokwim River</u>	<u>Kuskokwim Bay</u>	<u>Kuskokwim Area^a</u>
Chinook	19 - 56	16 - 42	35 - 98
Sockeye	41 - 137	13 - 120	54 - 257
Coho	222 - 660	35 - 206 ^b	257 - 866
Pink	0.1 - 0.5 ^b	0.03 - 0.11 ^b	0.6 - 0.61
Chum	199 - 1,380	13 - 83	212 - 1,463
Total	481 - 2,233	77 - 451	559 - 2,685

^a Except as noted all the projections are based on the previous (1980-89) average catches in all districts.

^b Kuskokwim Area pink salmon display a strong odd-even year cycle. This projection is based on the odd year catch for the previous 10 years.

Table 14 Kuskokwim Area Pacific herring proportion of biomass by age class, 1990.

	Age (years)												Total weight (wt)
District	2	3	4	5	6	7	8	9	10	11	12	13+	
Commercial catch ^a													
Security Cove				0.5	5.2	15.2	7.8	23.2	12.5	16.2	15.3	4.1	234
Goodnews Bay				0.1	7.5	18.7	12.3	13.8	14.2	15.6	13.0	4.9	455
Cape Avinof					3.6	13.8	9.7	22.9	9.0	15.3	15.6	10.0	50
Nelson Island ^b													
Nunivak Island ^c													
All Districts				0.2	6.5	17.3	10.7	17.4	13.3	15.8	13.9	5.0	739
Test Fishery ^c													
Security Cove				0.5	8.3	11.5	4.9	16.2	11.6	24.8	16.3	5.9	2650
Goodnews Bay		0.2	0.7	1.6	16.8	17.8	8.8	13.0	8.9	13.4	11.8	6.9	2577
Cape Avinof	0.0	3.6	7.2	4.4	26.8	19.7	13.8	9.6	4.9	4.8	4.5	0.7	2020
Nelson Island		1.0	2.1	1.8	17.2	12.4	8.4	14.2	11.1	14.7	12.7	4.4	2705
Nunivak Island			0.1	0.1	1.1	2.9	3.3	16.5	18.6	27.5	20.2	9.8	422
All Districts	0.0	1.0	2.1	1.9	16.0	14.6	8.5	13.6	9.8	15.6	12.1	4.9	10374

- a Commercial drift gill net
b No commercial fishery in 1990
c ADP&G variable mesh gill net

Table 15 Kuskokwim Area Pacific herring age frequency by district, 1990.

	Age (years)												Sample
District	2	3	4	5	6	7	8	9	10	11	12	13+	Size
Commercial catch ^a													
Security Cove				0.7	6.9	17.7	9.0	23.5	11.6	14.4	13.0	3.2	277
Goodnews Bay				0.2	9.9	23.0	13.0	13.3	12.4	13.5	10.9	3.8	548
Cape Avinof					5.0	16.8	10.9	22.7	8.4	13.4	13.4	9.2	119
Nelson Island ^b													0
Numivak Island ^b													0
Test Fishery ^c													
Security Cove				0.7	11.1	14.0	5.6	15.5	11.6	22.0	14.5	5.1	414
Goodnews Bay		0.2	1.5	2.5	18.4	17.4	8.2	14.3	9.4	13.1	10.9	4.2	1101
Cape Avinof	0.1	8.2	12.7	6.0	28.2	17.8	11.3	6.8	3.0	2.8	2.7	0.3	1161
Nelson Island		3.2	4.7	3.3	23.7	14.2	8.4	12.2	8.3	10.5	8.8	2.9	1460
Numivak Island			0.2	0.2	1.9	3.9	3.9	17.9	18.4	26.0	18.8	9.0	592

a Commercial drift gill net

b No commercial fishery in 1990

c ADF&G variable mesh gill net

Table 16 Summary of Pacific herring commercial harvest by fishing period for Kuskokwim Area fishing districts, 1990.

<u>District</u>	<u>Period</u>	<u>Date</u>	<u>Time</u>	<u>Total hours</u>	<u>Harvest (st)</u>
Security Cove	1	5/12	1900-2300	4.0	164.8
	2	5/13	1000-1300	<u>3.0</u>	<u>68.8</u>
			Total	7.0	233.6
Goodnews Bay	1	5/18	1430-1630	2.0	5.9
	2	5/19	1100-1900	8.0	79.4
	3	5/20	1200-2000	8.0	43.6
	4	5/22	0600-1000	4.0	60.7
	5	5/22	1500-2000	5.0	120.5
	6	5/23	0600-1100	<u>5.0</u>	<u>144.5</u>
			Total	32.0	454.6
Cape Avinof	1	5/22	1400-1500	1.0	10.1
	2	5/22	1600-1800	<u>2.0</u>	<u>39.6</u>
				3.0	49.7

Table 17 Projections of Pacific herring spawning biomass and harvest for commercial fishing districts in the Kuskokwim Area, 1991.

District	1991 Projection ^a			Exploitation
	Biomass (st)	Threshold (st) ^b	Harvest (st)	Rate (%)
Security Cove	1,490	1,200	224	15
Goodnews Bay	1,472	1,200	221	15
Cape Avinof	1,722	500	258	15
Nelson Island	1,805	2,500	- ^c	10 ^d
Nunivak Island	<u>235</u>	1,500	<u>-^c</u>	10 ^d
Total	6,724		703	

^a Preseason projection. Projection may be adjusted based on inseason biomass estimates.

^b Threshold biomass needed to allow a commercial fishery from 5 AAC 27.060 Bering Sea Herring Fishery Management Plan

^c Projected biomass is below minimum for commercial harvest; fishery will not be opened if threshold biomass is not exceeded.

^d Maximum exploitation rate if in-season biomass estimate exceeds threshold level. Commercial harvest will be regulated so that the biomass of herring escaping the fishery will not fall below the threshold level for that fishery.

FIGURES

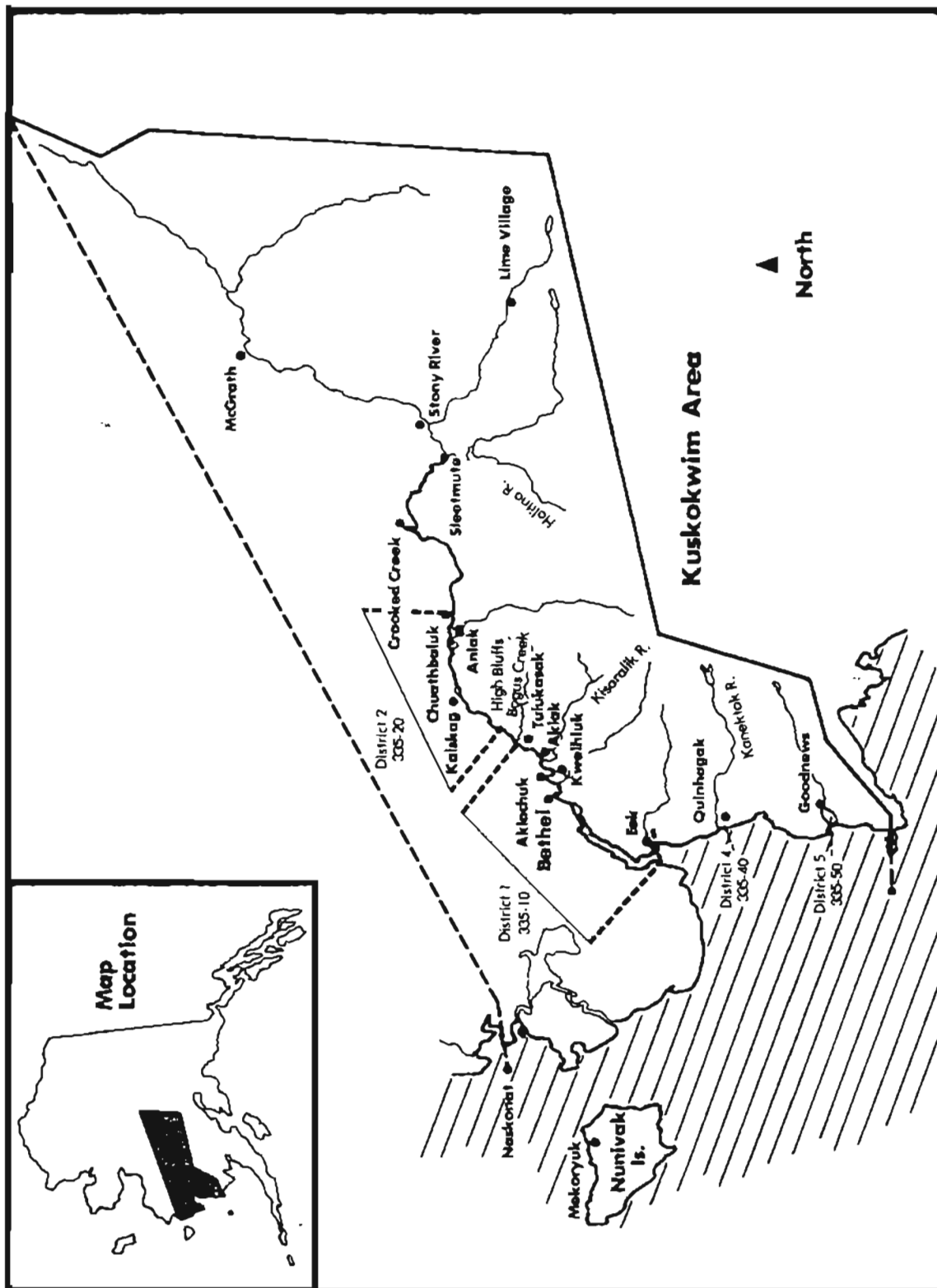


Figure 1. Kuskokwim Area Map.

**Kuskokwim Management Area
District W-1
Kuskokwim River**

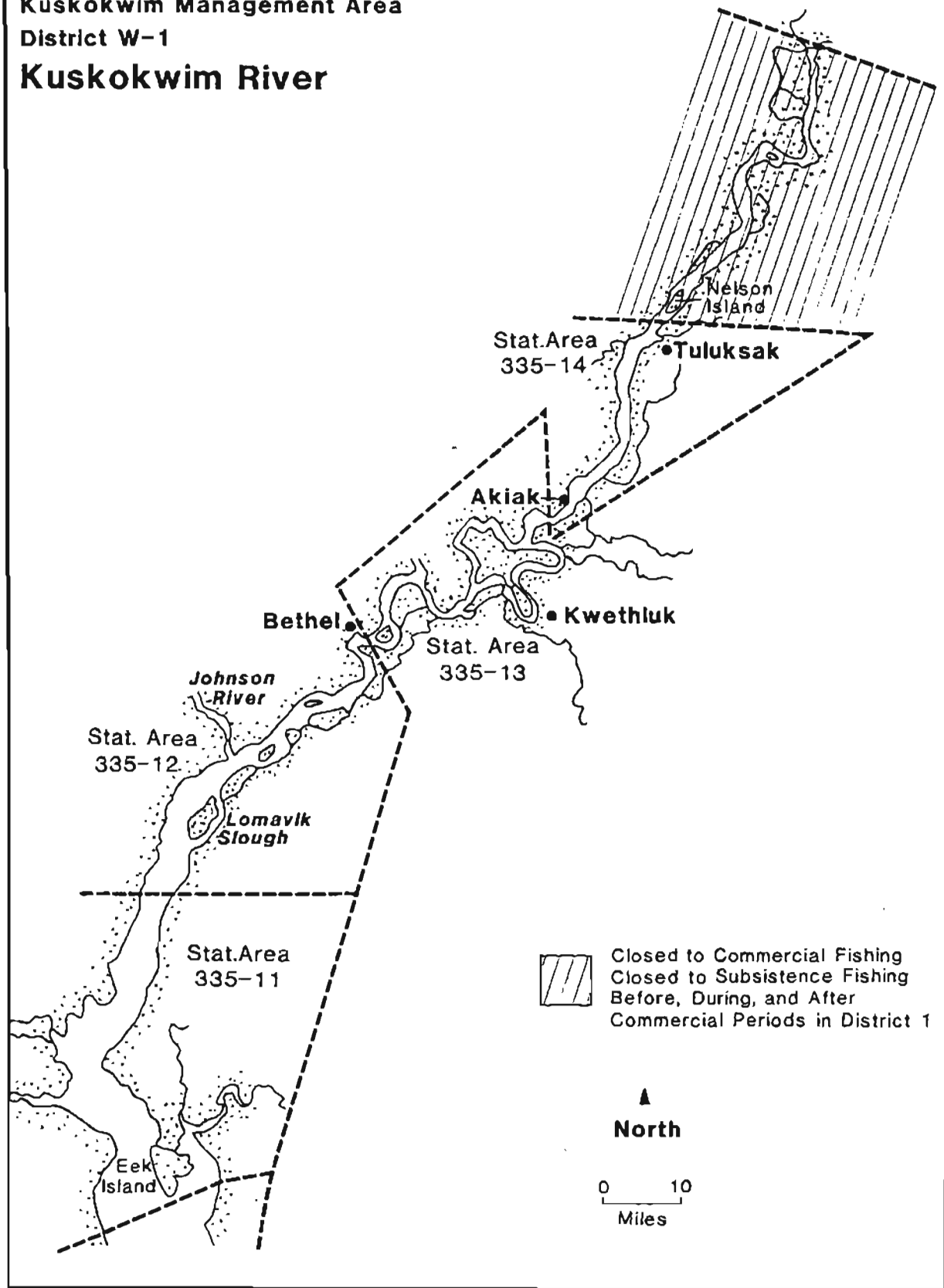


Figure 2. Kuskokwim Management Area, District W-1

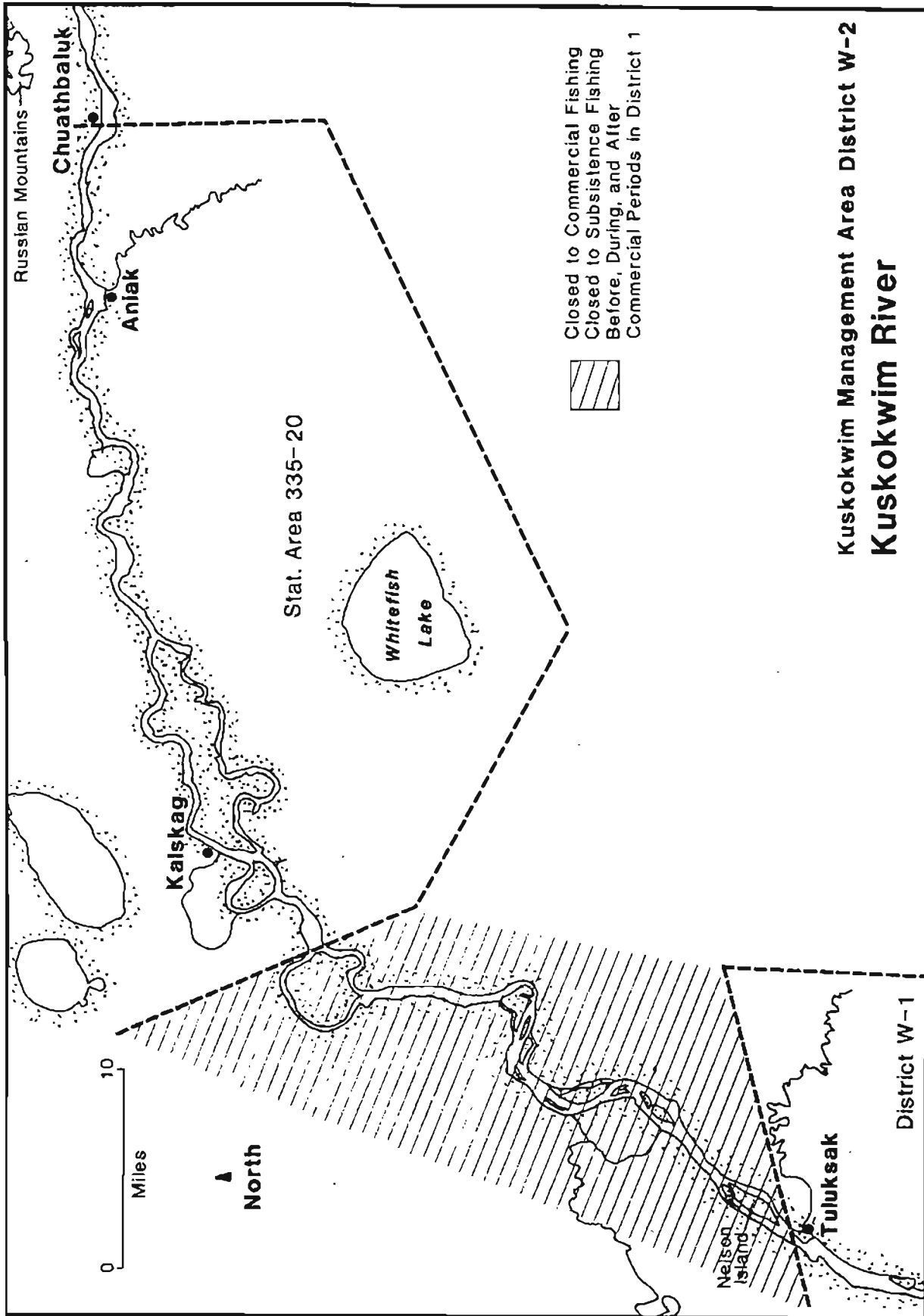


Figure 3. Kuskokwim Management Area, District W-2

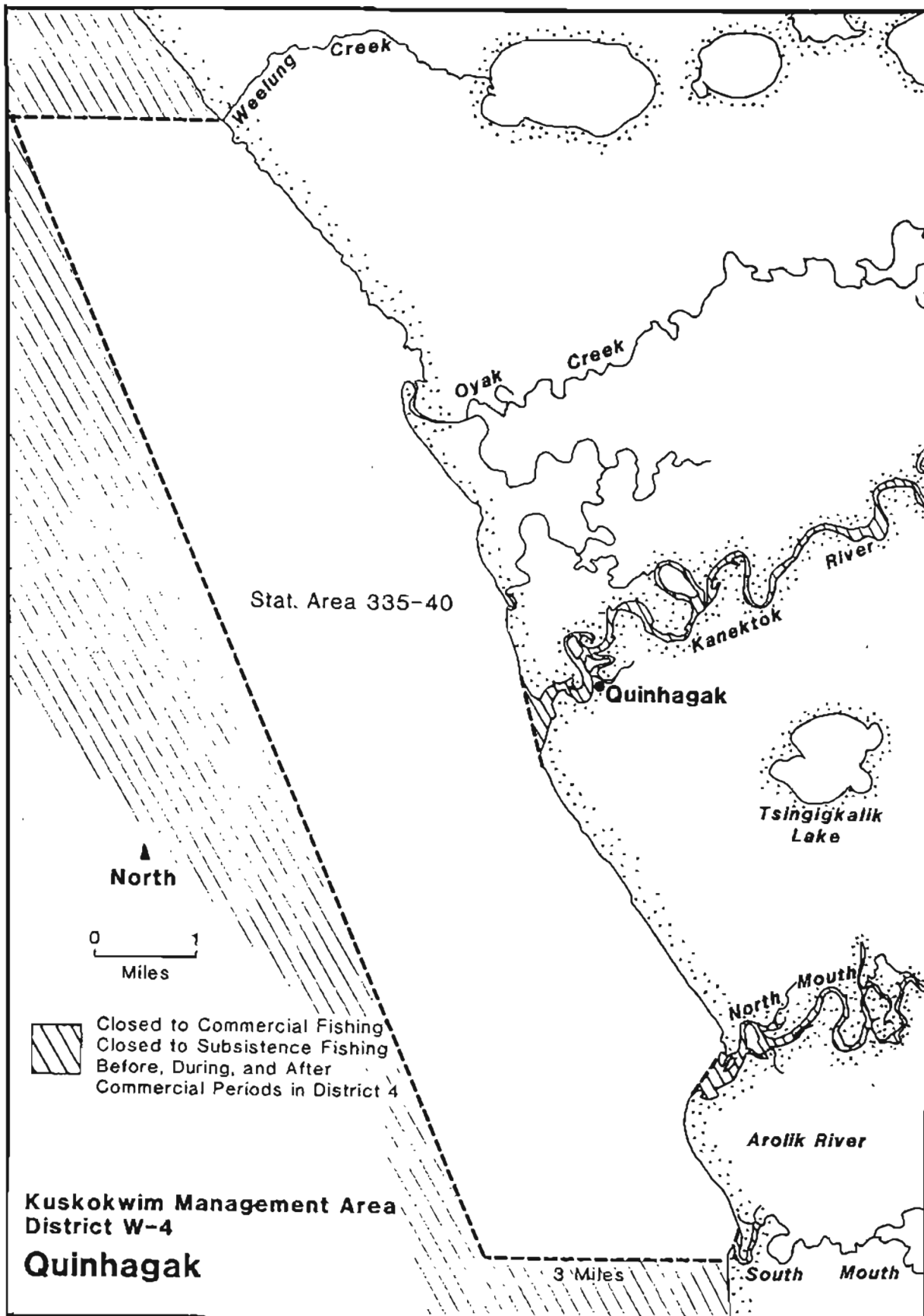


Figure 4. Kuskokwim Management Area, District W-4

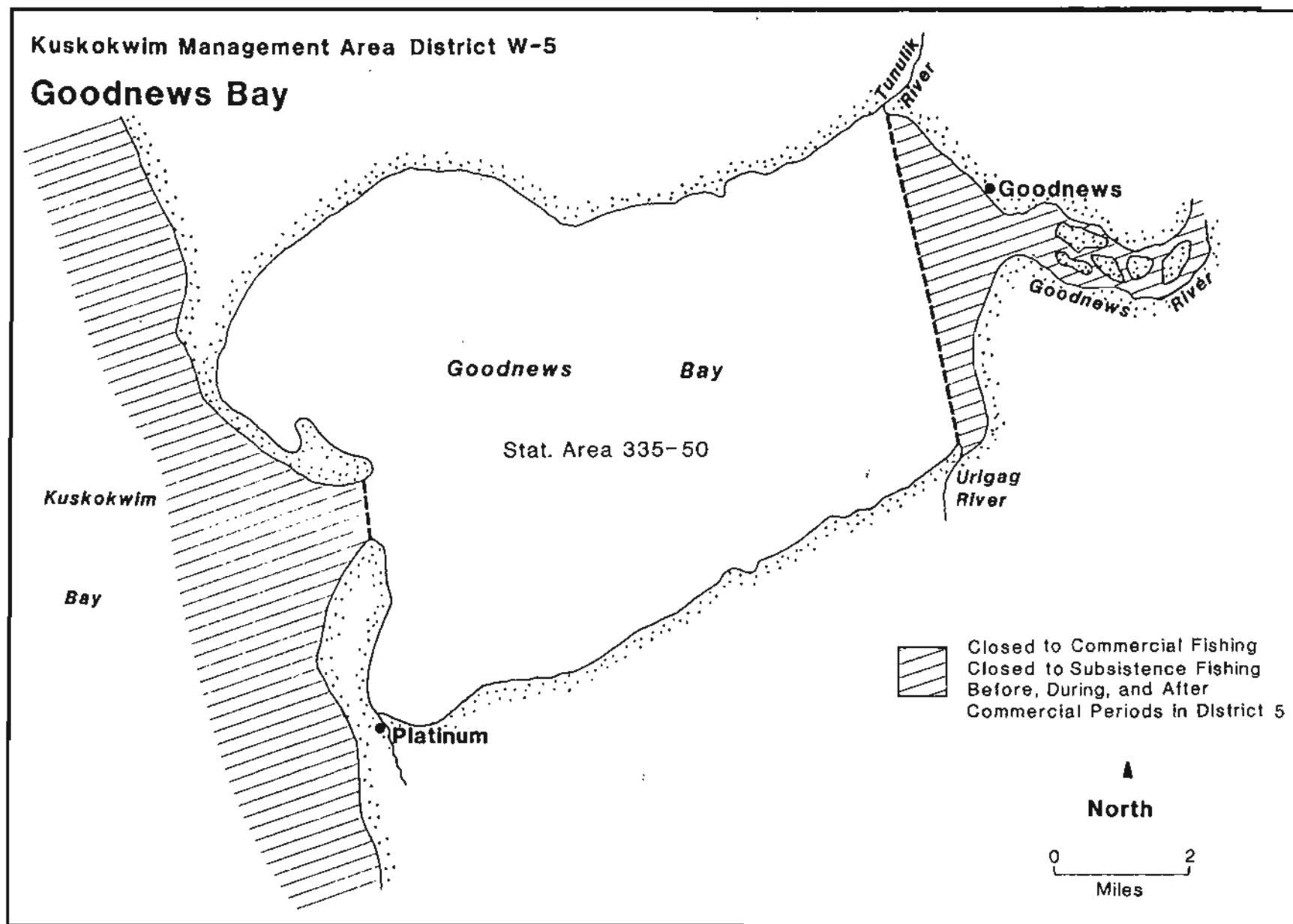
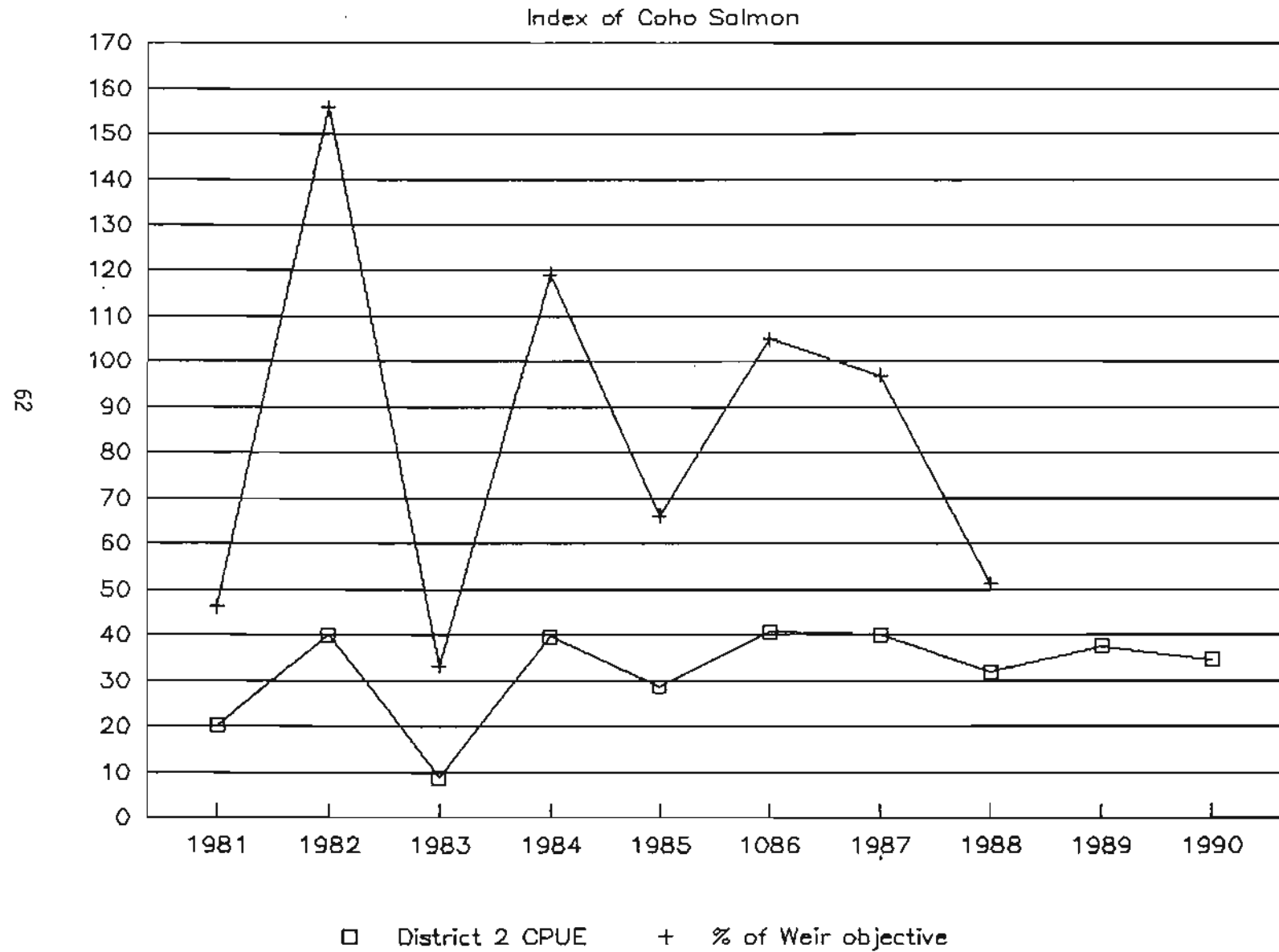


Figure 5. Kuskokwim Management Area, District W-5

Figure 6. District 2 CPUE vs Escapement



Kuskokwim River Aerial Index

Chinook Salmon, 1975-1990

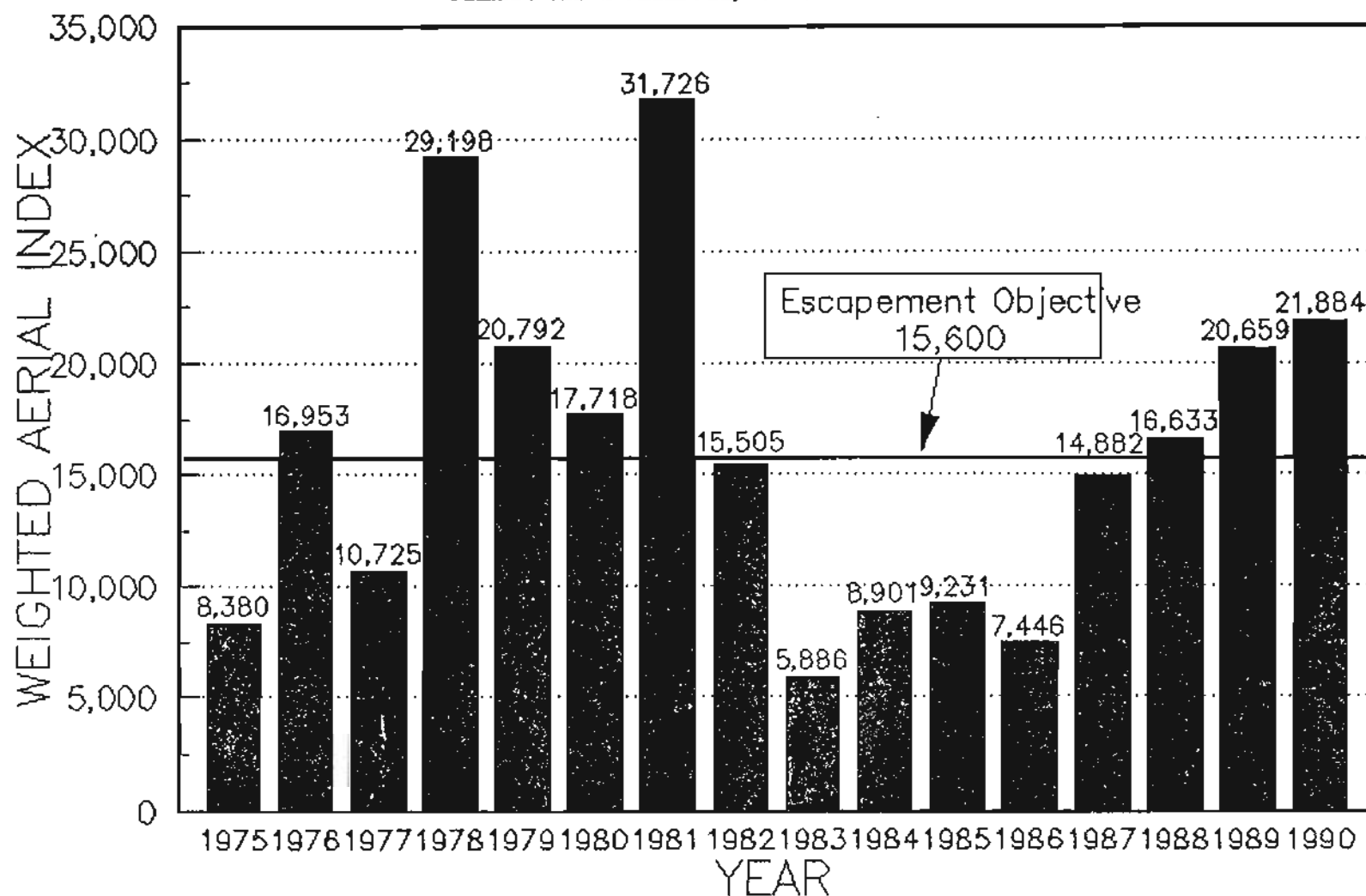


Figure 7. Kuskokwim drainage aerial chinook salmon escapement index, 1975-1990.

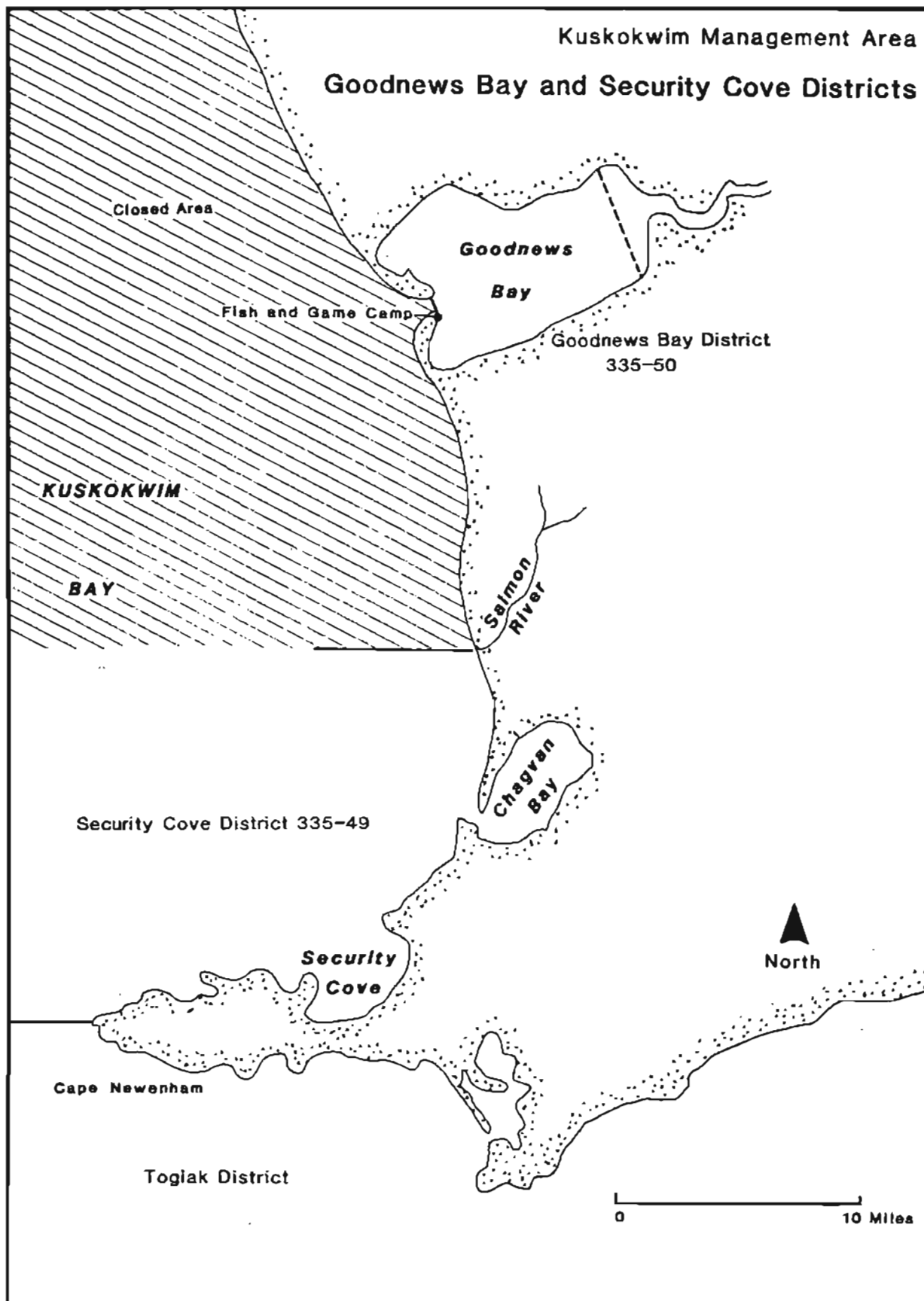


Figure 8. Goodnews Bay and Security Cove Herring Districts

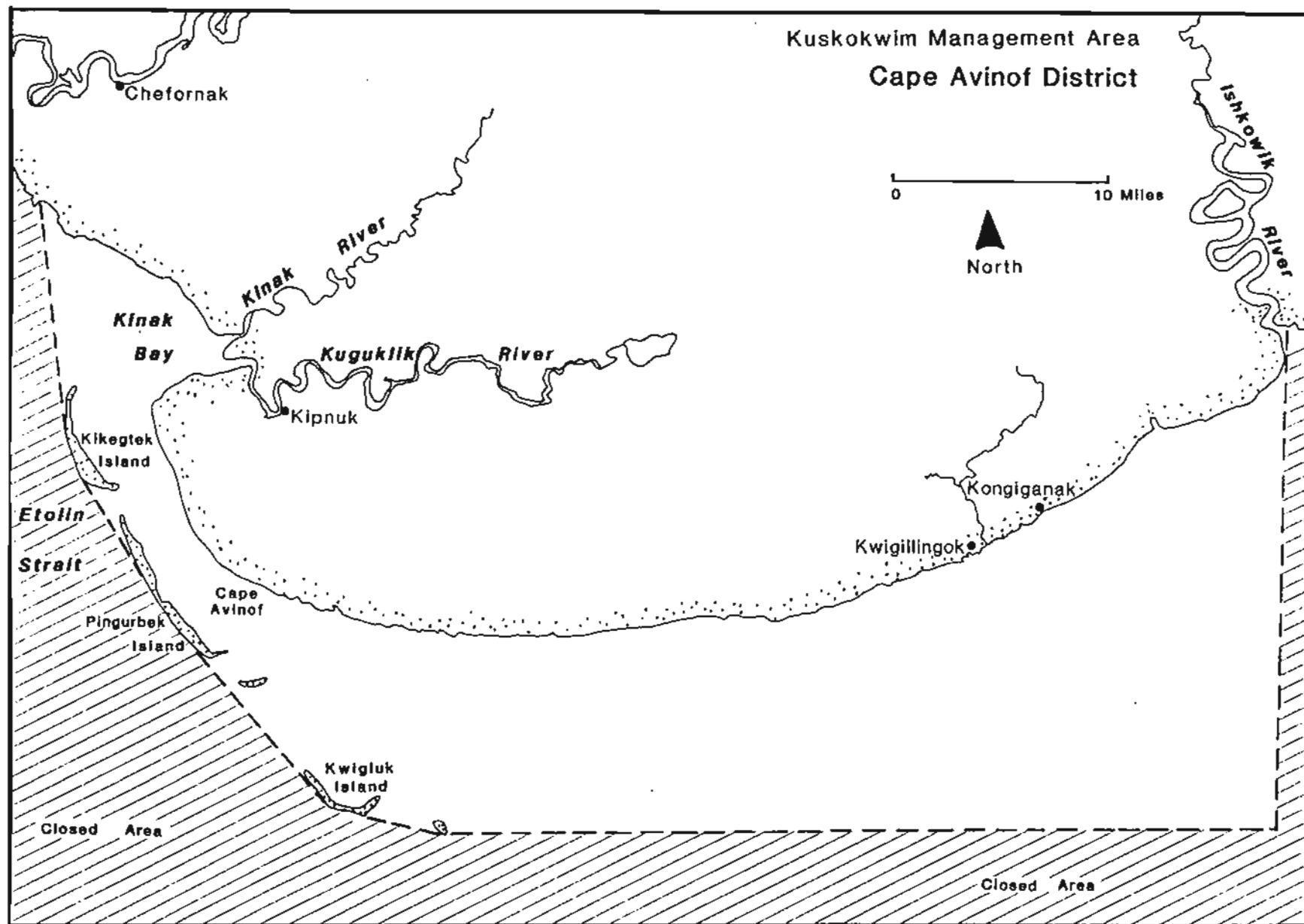


Figure 9. Cape Avinof Herring District

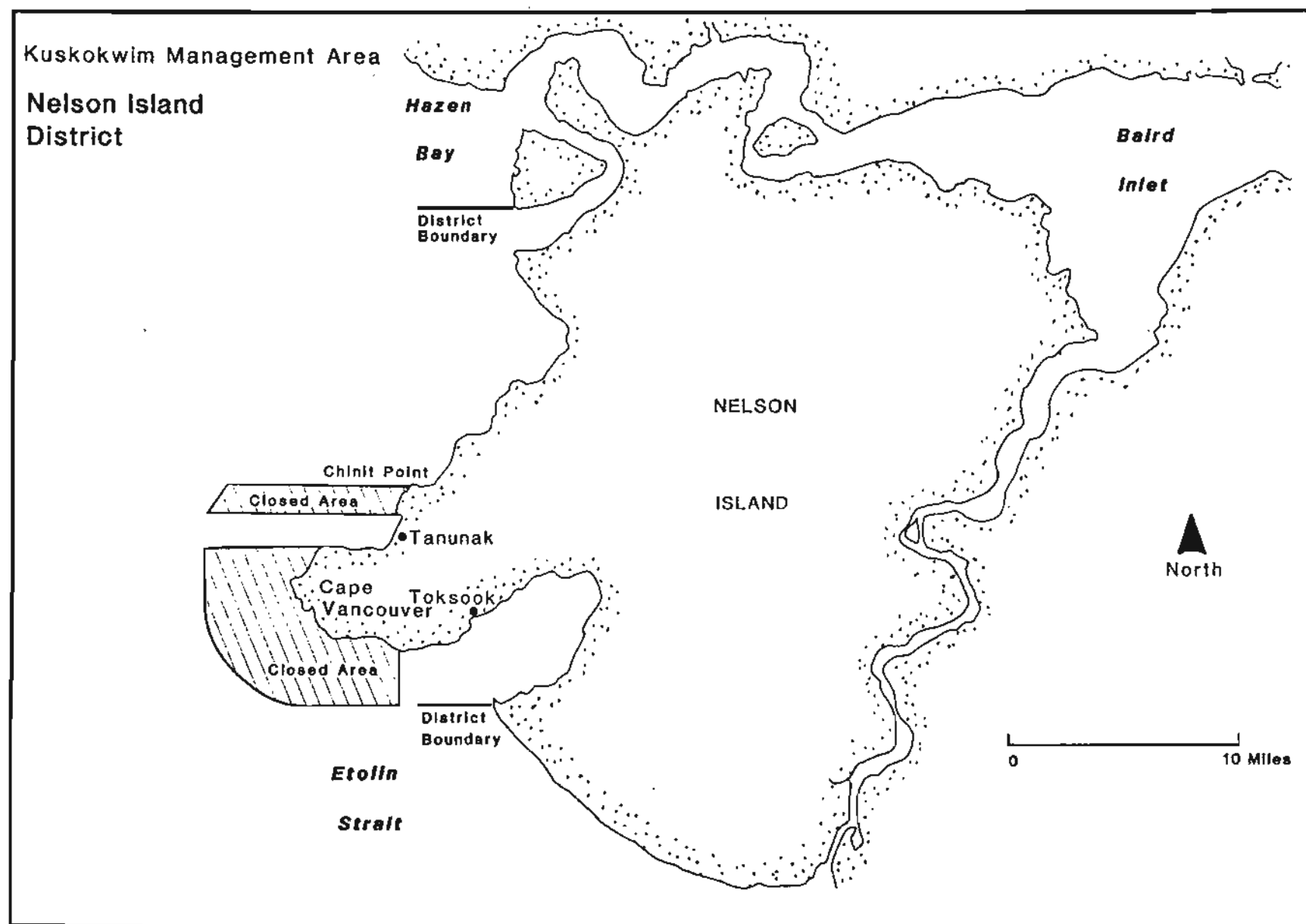


Figure 10. Nelson Island Herring District

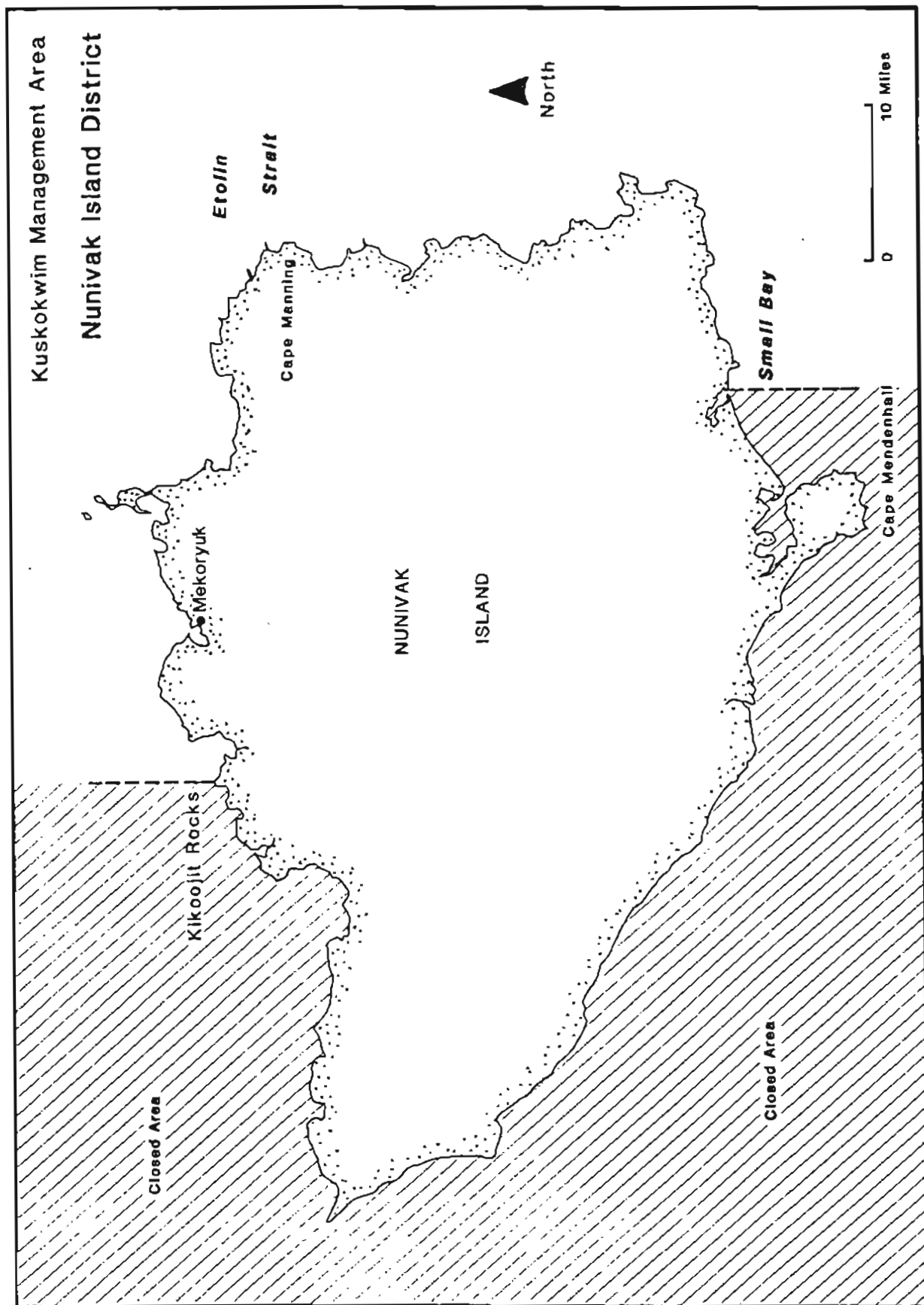


Figure 11. Nunivak Island Herring District

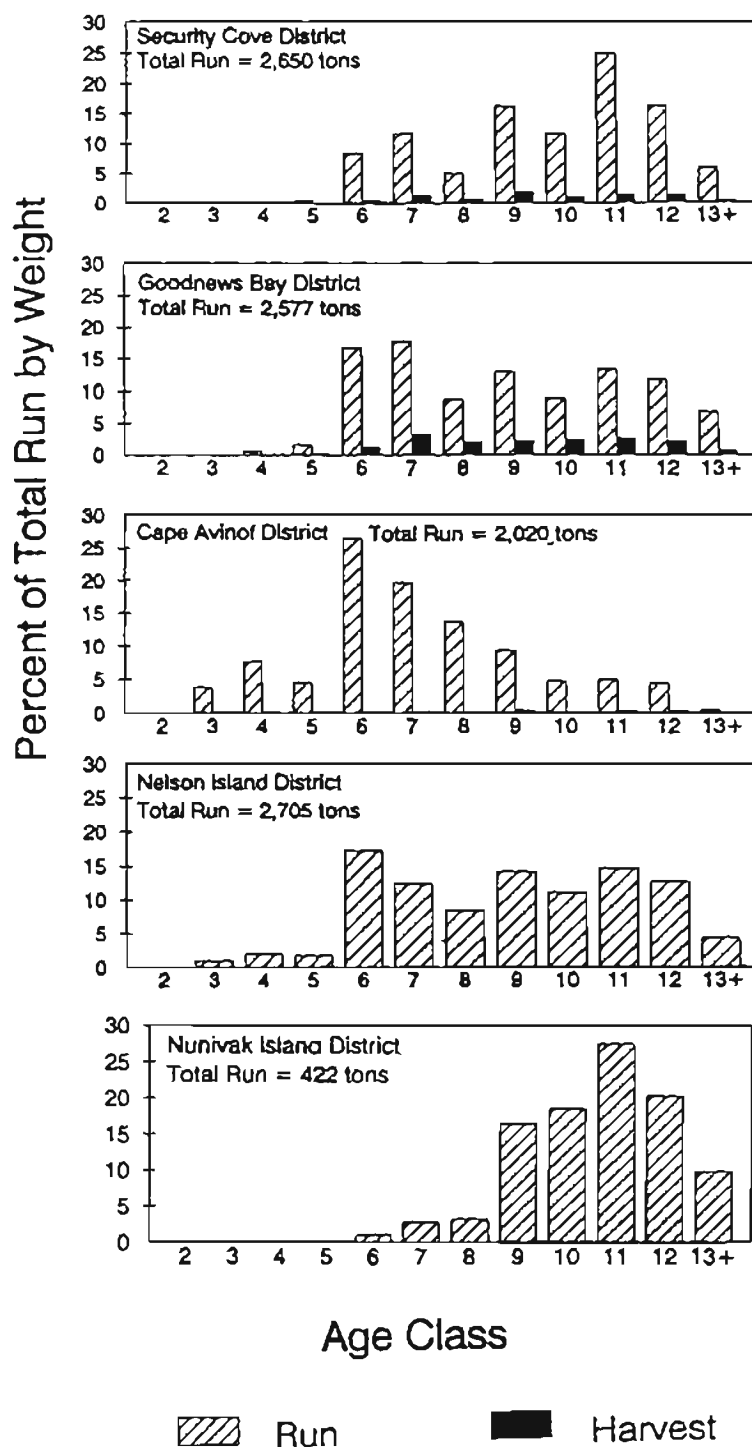


Figure 12. Age composition of Pacific herring in spawning populations and commercial harvests in Security Cove, Goodnews Bay, Cape Avinof, Nelson Island and Nunivak Island commercial herring fishing districts in Kuskokwim Bay, Alaska, 1990.

APPENDICES

APPENDIX A

Appendix A.1 Kuskokwim Area escapement index objectives for chinook, sockeye, coho and chum salmon.

		Escapement Objectives ^a			
		Chinook	Sockeye	Coho	Chum
<u>KUSKOKWIM RIVER:</u>					
1.	Kwethluk River	1.0	-	-	7.0
	a. 3-step Mt. to Canyon Cr.	0.2	-	-	-
	b. Canyon Creek				
2.	Kisaralik River				
	a. Airstrip to Kisaralik L.	1.0	-	-	8.0
	b. Kasigluk R. (upper to lower)	0.1	-	-	4.0
3.	Tuluksak R. (Fog R. to Bear Cr.)	0.4	-	-	5.0
4.	Aniak River				
	a. Buckstock R. to Aniak L.	1.5	-	-	10.0
	b. Salmon River	1.6	-	-	3.0
	c. Aniak Sonar Project ^b	-	-	-	250.0
5.	Holitna River				
	a. Nogamut to Kashegegok ^c	2.0	1.0	-	49.0
	b. Kogrukluk Weir ^c	10.0	2.0	25.0	30.0
6.	Salmon River (Pitka Fork)	1.3	-	-	-
<u>KUSKOKWIM BAY:</u>					
1.	Kanektok River to Kagati Lake	5.8	15.0	25.0	30.5
2.	Goodnews River System				
	a. Main Fork and lakes	1.6	15.0	15.0	17.0
	b. Middle Fork and lakes	0.8	5.0	2.0	4.0
	c. Middle Fork Tower Project ^d	3.5	25.0	-	15.0

a Escapement objectives in thousands of fish are preliminary and are subject to change as additional data becomes available. Unless otherwise indicated, escapement objectives are based on aerial index counts which do not represent total escapement, but do reflect annual spawner abundance trends when made using standard survey methods under acceptable survey conditions.

b Sonar total escapement estimates.

c Total Kogrukluk River escapement estimates.

d Tower total escapement estimates.

Appendix A.2 Estimated dollar value of Kuskokwim Area commercial salmon fishery, 1964 - 1990.

<u>YEAR</u>	<u>GROSS VALUE OF CATCH TO FISHERMAN</u>	<u>PERMITS FISHED^a</u>	<u>AVERAGE INCOME</u>
1964	83,030		
1965	90,950		
1966	87,466		
1967	138,647		
1968	290,370		
1969	297,233		
1970	362,470		
1971	371,220		
1972	360,727		
1973	827,735		
1974	1,056,042		
1975	899,178		
1976	1,380,229		
1977	3,891,950		
1978	2,337,470		
1979	3,678,000		
1980	2,725,134		
1981	3,766,525		
1982	4,213,954		
1983	2,670,400		
1984	5,809,000	774	7,505
1985	3,248,089	781	4,159
1986	4,746,089	789	6,015
1987	6,392,822	798	8,011
1988	12,514,492	811	15,431
1989	5,194,025	824	6,303
1990	4,895,070	824	5,941
TEN YEAR AVERAGE (1980-1989)	\$5,128,053	796 ^b	6,442 ^b

^a Permit holders who made at least one delivery. Information not available prior to 1983.

^b Previous six year (1984-1989) average due to unavailable data.

Year	COMMERCIAL CATCH					SUBSISTENCE CATCH			COMBINED TOTAL HARVEST
	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Other*	Total
1913	7,800					7,800			7,800
1914		2,667				2,667			2,567
1915									
1916	949					949			949
1917	7,878					7,878			7,878
1918	3,055					3,055			3,055
1919	4,836					4,836			4,836
1920	34,853					34,853			34,853
1921	9,854					9,854			9,854
1922	8,944	6,120				15,064		180,000	195,064
1923	7,254					7,254			7,254
1924	19,253	900	7,167	7,167		34,487	17,700	203,148	255,335
1925	1,644	5,800				7,444	10,800	230,850	249,094
1926								738,576	738,576
1927								286,254	286,254
1928								481,090	481,090
1929								560,196	560,196
1930	7,626	2,448				10,074		538,650	548,724
1931	8,541					8,541		389,367	397,908
1932	9,339					9,339		746,415	755,754
1933							6,290	443,998	450,288
1934							20,800	597,132	617,932
1935	6,448		8,296			14,744	22,930	554,040	591,714
1936	624					624	33,500	549,423	583,547
1937	480					480		537,111	537,591
1938	624		828			1,452	10,153	400,242	411,847
1939	134					134	14,000	125,425	139,559
1940	247		500			747	8,000	415,523	424,270
1941	187		674			861	8,000	415,523	424,384
1942							6,400	325,339	331,739
1943							6,400	325,339	331,739
...									
1946	2,288		674			2,962			2,962
1947	5,356					5,356			5,356
...									
1951	4,210					4,210			4,210
...									
1954	57					57			57
...									
...									
1959	3,760					3,760			3,760
1960	5,969	5,649	5,498		3	17,119	18,752	301,753	337,624
1961	23,246	2,308	5,090	91	18,864	49,599	27,457	179,529	256,585

- Continued -

Year	COMMERCIAL CATCH						SUBSISTENCE CATCH				COMBINED		
	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Coho ^c	Small ^d	Total	TOTAL HARVEST		
1962	20,867	10,313	12,598	4,340	45,707	93,825	13,455	161,849	175,304	269,129	362,954		
1963	18,571		15,660			34,231	33,180	137,649	170,829	205,060	239,291		
1964	21,230	13,422	28,992	939	707	65,290	29,017	190,191	219,208	284,498	349,788		
1965	24,965	1,886	12,191		4,242	43,284	24,697		250,878	275,575	318,859		
1966	25,823	1,030	22,985	268	2,610	52,716	49,022		175,735	224,757	277,473		
1967	29,986	652	58,239		8,235	97,112	60,919		214,468	275,387	372,499		
1968	43,157	5,887	154,302	75,818	19,694	298,858	35,380		278,008	313,388	612,246		
1969	64,777	10,362	110,473	1,251	50,377	237,240	40,208		204,105	244,313	481,553		
1970	65,032	12,654	62,245	27,422	60,566	227,919	69,219	11,868	246,810	327,897	555,816		
1971	44,936	6,054	10,006	13	99,423	160,432	42,926	6,899	116,391	166,216	326,648		
1972	55,482	4,312	23,880	1,952	97,197	182,823	40,145	1,325	120,316	161,786	344,609		
1973	51,374	5,224	152,408	634	184,207	393,847	38,526	23,746	179,259	241,531	635,378		
1974	30,670	29,003	179,579	60,052	196,127	495,431	26,665	32,780	277,170	336,615	832,046		
1975	27,799	17,535	109,814	899	223,532	379,579	47,569		176,389	223,958	603,537		
1976	49,262	13,636	112,130	39,998	231,877	446,903	57,899	4,312	223,792	286,003	732,906		
1977	58,256	18,621	263,728	434	298,959	639,998	57,925	12,193	203,397	273,515	913,513		
1978	63,194	13,734	247,271	61,968	282,044	668,211	38,209	12,437	125,052	175,698	843,909		
1979	53,314	39,463	308,683	574	297,167	699,201	57,031		163,451	220,482	919,683		
1980	48,242	42,213	327,908	30,306	561,483	1,010,152	62,139	47,335	168,987	278,461	1,288,613		
1981	79,378	105,940	278,587	463	485,635	950,003	63,248	28,301	163,554	255,103	1,205,106		
1982	79,816	97,716	567,451	18,259	325,471	1,088,713	60,426	45,181	195,691	301,298	1,390,011		
1983	93,676	90,834	249,018	379	306,554	740,461	51,020	2,834	149,172	203,026	943,487		
1984	74,006	81,307	829,965	23,902	488,482	1,497,662	60,944	15,016	144,651	220,335	1,717,997		
1985	74,083	121,221	382,096	111	224,680	802,191	45,720	33,631	24,667	1,062	96,791	201,871	1,004,062
1986	44,972	142,029	736,910	16,569	349,268	1,289,748	54,256		29,742		142,930 ^c	226,928	1,516,676
1987	65,558	170,849	478,594	163	603,274	1,318,438	71,804	31,555	18,085	291	70,709	192,444	1,510,882
1988 ^d	74,552	149,927	623,719	37,592	1,443,916	2,239,786	56,695	25,571	32,426		118,181	232,873	2,565,615
1989 ^d	67,003	82,628	556,312	819	802,199	1,508,961	77,030	33,958	50,046		132,858	293,834	1,802,853
1990	84,706	203,374	445,062	16,082	522,535	1,272,759	77,328	32,218	44,519		108,557	262,622	1,535,381
Ten Year Average (1980-1989)	70,129	108,466	503,056	25,323*	559,096	1,244,611	60,328	na	29,363	na	150,959 ^c	240,617	1,494,530

^a Primarily chum and coho salmon.

^b Reported subsistence coho salmon harvest only. Coho salmon subsistence harvest is poorly documented with no Kuskokwim River estimate attempted prior to 1988.

^c Includes sockeye, pink and chum salmon.

^d The personal use catch is included with the subsistence catch.

^e Even years only.

Appendix A.4 Historic salmon escapement data from current Kuskokwim Area projects, 1976 - 1990.

YEAR	Operating Period	SPECIES				
		Chinook	Sockeye	Coho	Pink	Chum
<u>KOGRUGLUK WEIR^a</u>						
1976	06/29 to 07/31	5,818	2,366	b	-	8,417
1977	07/14 to 07/27	1,945	1,637	b	2	19,444
1978	06/28 to 07/31	13,601	1,699	b	2	47,010
1979	07/01 to 07/24	11,420	476	b	1	4,836
1980	07/01 to 07/11	6,572	3,200	b	1	41,777
1981	06/27 to 10/25	16,820	18,077	11,532	6	57,373
1982	07/09 to 09/14	12,185	22,156	38,961	19	79,580
1983	06/22 to 07/02	2,992	1,176	8,327	-	9,407
1984	06/19 to 09/15	4,928	4,130	29,824	-	41,484
1985	06/29 to 09/07	4,438	4,366	16,536	-	17,181
1986	07/06 to 10/05	4,296	4,179	26,230	-	15,511
1987	08/09 to 09/23	b	b	24,238	-	b
1988	07/05 to 09/17	11,194	6,158	12,799	-	41,881
1989	07/07 to 09/14	11,940	5,810	b	-	39,548
1990	06/28 to 09/07	10,219	8,406	b	1	26,765
<u>ANIAK SONAR^c</u>						
1980	06/22 to 07/30	56,469	-	-	-	1,091,286
	08/16 to 09/12	-	-	81,556	-	-
1981	06/16 to 08/06	42,060	-	-	-	526,320
1982	06/21 to 08/01	33,864	-	-	-	389,226
1983	06/18 to 07/28	4,911	-	-	-	114,869
1984	06/16 to 07/30	-	-	-	-	275,261
1985	06/22 to 07/28	-	-	-	-	253,048
1986	06/26 to 07/24	-	-	-	-	209,080
1987	06/22 to 07/31	-	-	-	-	193,464
1988	06/22 to 07/31	-	-	-	-	401,511
1989	06/21 to 07/24	-	-	-	-	243,936
1990	06/23 to 08/06	-	-	-	-	300,408
<u>MIDDLE FORK GOODNEWS RIVER TOWER^d</u>						
1981	06/13 to 08/15	3,688	49,108	357	1,327	21,827
1982	06/23 to 08/03	1,395	56,255	62	13,855	6,767
1983	06/11 to 07/28	6,027	25,816	0	34	15,548
1984	06/15 to 07/31	3,260	32,053	249	13,744	19,003
1985	06/27 to 07/31	2,831	24,131	282	144	10,367
1986	06/16 to 07/24	2,083	51,069	163	8,133	14,756
1987	06/22 to 07/30	2,274	28,871	62	62	17,519
1988	06/23 to 07/30	2,712	15,799	6	6,781	20,799
1989	06/29 to 07/31	1,915	21,196	145	246	10,380
1990	06/19 to 07/24	3,636	31,679	0	3,378	6,410

a Pink salmon can pass freely through the Kogrukluk Weir.

b No counts or incomplete count as project was not operated during the species' migration.

c Aniak sonar counts are adjusted to provide the total estimated escapements.

d The Goodnews River salmon counting tower's scheduled termination date precludes adequate assessment of the coho and pink salmon escapement.

VILLAGE ^a	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
KIPNUK		248	11	123	75	g							0	0	
KWIGILLINGOK	250	35	43	106	339	g	250	957	70		220	200	10	75	
KONGIGANAK	h	h	h	h						385	891	41	0		
TUNTUTULIAK	226	2,226	842	2,853	1,826	1,575	3,097	3,462	2,214	2,195	3,558	1,841	3,214	2,859	1,577
EEK					f	f	2,921	4,572	2,566	2,038	2,065	1,882	1,969	1,981	2,356
KASIGLUK & EEK					1,857	3,123									
KASIGLUK	135	1,215	127	1,302	f	f	1,032	2,766	1,485	2,888	3,931	1,645	1,292	1,864	1,411
NUNAPITCHUK	683	2,042	848	1,874	636	490	2,213	1,926	1,750	2,279	4,680	1,978	2,496	2,663	1,165
ATMAUTLUAK	h	h	h	h	h	h	h	h	h	h	1,205	548	864	1,106	382
NAPAKIAK	1,830	2,573	2,191	3,148	2,677	2,872	3,658	3,895	2,468	3,546	4,960	1,868	2,009	1,763	1,224
NAPASKIAK	536	1,258	759	1,569	2,201	1,071	2,710	2,998	1,663	2,227	3,446	1,916	1,578	2,048	900
OSCARVILLE	1,968	282	75	309	339	688	322	1,127	393	457	542	570	196	586	180
BETHEL	1,923	4,150	1,378	7,019	4,114	3,371	8,046	13,925	6,205	7,472	17,026	8,731	8,371	8,898	4,631
KWETHLUK	2,692	3,763	2,329	5,050	3,262	2,887	6,551	6,993	2,848	3,187	7,932	5,564	5,137	3,444	2,694
AKIACHAK	1,626	3,052	1,800	2,533	3,488	3,685	4,904	5,543	3,755	2,602	7,022	4,818	3,872	2,592	1,726
AKIAK	1,865	3,159	906	2,869	2,495	1,345	3,670	3,660	1,822	1,275	3,290	2,688	1,899	1,895	1,292
TULUKSAK	737	1,486	493	1,295	572	1,021	1,576	1,709	1,048	1,131	1,995	1,280	1,318	1,322	883
LOWER KALSKAG	961	571	f	f	710	f	f	f	1,502	2,102	2,146	2,355	2,604	1,309	1,586
UPPER KALSKAG	667	1,049	f	f	1,143	f	f	f	1,619	1,623	734	601	401	938	463
KALSKAGS COMB.			805	2,661		1,395	3,379	3,567							
ANIAK	1,057	688	185	602	1,104	f	2,072	1,280	517	1,406	2,136	1,076	2,105	1,030	1,952
ANIAK ^b						642									
CHUATRBALUK ^c	64	54	10	30	74	f	139	217	34	180	219	179	261	942	674
NAPAIMUTE	20	16	44	52	134	g	78	60	94	19	22	17	20	13	6
CROOKED CREEK	747	518	561	859	1,358	374	1,446	585	77	541	684	291	183	269	650
GEORGETOWN							12		0	9	2	0	0	0	
RED DEVIL	f	40	f	f	f	f			111	142	232	135	182	138	205
SLEETMUTE	f	222	f	f	f	f	303	343	207	267	161	181	69	504	269
SLEETMUTE ^d	465	262	144	228	314	79			318	409	393	316	251	642	474
KASHEGELOK ^e							10								
STONY RIVER	435	25	31		299	79	636	303	176	2,187	105	402	95	287	439
LIME VILLAGE									0	50	15	2,119	0	0	
MCGRATH							300	25							
TAKOTNA															
MEDFRA															
NIKOLAI															
TELIDA															
QUINBAGAK								1,349	2,756						
GOODNEWS BAY															
PLATINUM															
TOTAL	18,752	27,457	13,455	33,180	29,017	24,697	49,022	60,919	35,380	40,208	69,219	42,926	40,145	38,526	26,665

-continued-

VILLAGE*	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
KIPNUK								60							134*
KWIGILLINGOK		75	382	75											
KONGIGANAK		122	361					52			235			468	1,307
TUNTUTULIAK	3,492	4,807	2,470	1,656	2,268	2,545	4,446	1,984	2,523	3,519	2,644	2,452	2,522	2,580	3,552
EEK	2,110	3,232	2,675	1,807	2,003	1,557	1,731	2,578	2,040		1,436			1,987	1,685
KASIGLUK	1,713	1,613	1,324	608	1,142	1,704	3,377	3,115			2,054			1,077	2,602
NUNAPITCHUK	2,092	2,578	2,622	2,178	2,109	2,612	2,918	2,577	2,688		2,019	3,410	3,372	1,664	3,087
ATMAUTLUAK	1,042	1,159	1,015	966	2,242	1,288	1,247	1,752			1,559			891	1,227
NAPAKIAK	2,864	3,330	2,702	2,140	2,191	2,582	3,017	3,500	2,047		1,805		2,760	1,960	3,785
NAPASKIAK	2,303	3,566	1,989	2,122	2,085	3,160	2,911	2,872			2,155		2,907	2,977	4,181
OSCARVILLE	891	623	672	349	629	477	495	523			916		745	415	1,200
BETHEL	11,688	13,215	9,408	6,905	11,564	12,591	15,367	13,516	8,492	11,066	6,940	11,984	8,107	11,671	19,214
KWETHLUK	3,179	4,193	5,563	3,172	6,919	7,627	6,167	5,897		6,732	4,937	5,824	8,779	7,543	7,388
AKIACHAK	3,534	4,915	5,407	2,951	4,818	5,405	3,094	4,468		5,588	3,254		4,871	5,613	5,438
AKIAK	2,837	3,076	2,880	1,850	3,567	3,355	2,386	2,745		3,413	2,975		3,683	3,235	4,562
TULUKSAK	1,338	1,411	2,906	1,906	1,489	2,807	2,446	2,220	1,671	2,286	2,749		3,712	2,720	3,781
LOWER KALSKAG	2,755	4,536	1,750	1,951	2,821	3,917	3,271	2,594		3,242	1,707	1,666		2,204	2,843
UPPER KALSKAG	1,752	1,413	2,813	1,253	1,590	1,889	1,171	963		657	605	587		693	1,256
ANIAK	1,391	1,490	4,991	1,331	2,634	2,750	3,102	2,071	3,174	1,847	1,828	4,624	2,131	2,258	2,860
CHUATHBALUK*	594	657	1,507	1,238	2,189	1,507	841	1,491			1,102			102	446
NAPAIMUTE	16	420	176	144	149	90	45	138			53			96	
CROOKED CREEK	238	264	619	488	728	654	512	515			218			481	427
GEORGETOWN			66	0		93									
RED DEVIL	623	195	324	153	488	255	298	273			176			175	156
SLEETMUTE	256	356	684	300	755	220	728	242		154	745			308	420
SLEETMUTE*	879	551	1,008	453	988	475					921				
KASHEGELOK*			h	156	233	92									
STONY RIVER	761	620	33	182	171	332	233	419			167			210	692
LIME VILLAGE	100	33	0		38									426	105
MCGRATE					581			160	830	730	59			253	519
TAKOTNA					65									150	62
MEDFRA							i	i	i	i	i	i			
NIKOLAI					60		500	778	750	795	615			150	706
TELIDA															1
QUINHAGAK			2,012	2,328	1,420	1,940	2,562	2,402	2,542	3,109	2,341	2,682	3,663	2,5083,048	
GOODNEWS BAY			574		228	498	1,309	1,185	1,004	597	399	513	640	289	414
PLATINUM					110	192	100	51	62	32	27	42	176	21	44
MEKORYUK															0
NEWTOK															10
NIGHTMUTE															0*
TOKSOOK BAY															450
TUNUNAK															488
TOTAL		47,569	57,899	57,925	38,209	57,031	62,139	63,248	60,426	51,020	60,668	45,720	54,256	71,804	77,030

-continued-

VILLAGE*	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
KIPNUK	108														
KWIGILLINGOK															
KONGIGANAK	915														
TUNTUTULIAK	2,537														
EZEK	4,609														
KASIGLUK	2,869														
NUNAPITCHUK	2,244														
ATMAUTLUAK	2,067														
NAPAKIAK	3,413														
NAPASKIAK	3,413														
OSCARVILLE	721														
BETHEL	18,248														
KWETELUK	7,335														
AKIACEKAK	5,204														
AKIAK	4,177														
TULUKSAK	1,706														
LOWER KALSKAG	2,515														
UPPER KALSKAG	1,446														
ANIAK	3,075														
CHUATHEBALUK*	1,290														
CROOKED CREEK	591														
RED DEVIL	250														
SLEETMUTE	597														
STONY RIVER	385														
LIME VILLAGE	205														
MCCRATH	688														
TAKOTNA	126														
MEDFRA															
NIKOLAI	547														
TELIDA															1
QUINBAGAK	5,050														
GOODNEWS BAY	682														
PLATINUM	177														
MEKORYUK	0														
NEWTOK	1														
NIGHTMUTE	3														
TOKSOOK BAY	135														
TUNUNAK	0														
TOTAL	77,329														

-continued-

- a Lower Kuskokwim River villages 1 through 16; Middle Kuskokwim River villages 17 through 23; Upper Kuskokwim River villages 24 through 37; Kuskokwim Bay villages 38 through 40.
- b Aniak, Chuathbaluk and Russian Mission.
- c Var. Russian Mission, Little Russian Mission.
- d Sleetmute to Red Devil.
- e Kashegalok and Holitna.
- f Data collected, but reported with another village.
- g Data collected, combined with unspecified village or villages.
- h Village not yet founded.
- i Village abandoned.
- j Kuskokwim Area total estimate based on a village subsurvey.
- k Reported catch only.

Appendix A.6

Kuskokwim Area subsistence chum salmon harvest by village, 1985 - 1990.

VILLAGE	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
KIPNUK					37	540									
KWIGILLINGOK															
KONGIGANAK	671			1,178	1,830	618									
TUNTUTULIAK	4,346	2,734	5,385	4,424	4,559	4,072									
EEK	401			1,188	966	2,665									
KASIGLUK	4,199			2,788	2,872	2,623									
NUNAPITCHUK	4,346	4,676	4,621	5,312	6,674	4,053									
ATMAUTLUAK	4,440			3,701	3,014	3,168									
NAPAKIAK	3,686		2,784	2,876	6,934	6,538									
NAPASKIAK	5,810		6,832	8,876	12,203	5,488									
OSCARVILLE	1,294		1,135	2,461	1,132	676									
BETHEL	9,260	14,778	7,974	13,536	19,214	16,852									
KWETHLUK	6,866	9,736	7,636	14,667	10,237	8,016									
AKIACHAK	5,931		4,355	10,417	7,307	6,222									
AKIAK	6,724		3,837	5,847	7,216	6,227									
TULUKSAK	6,064		3,466	5,826	7,961	4,967									
LOWER KALSKAG	4,637	2,538		9,016	4,069	3,637									
UPPER KALSKAG	1,855	3,684		3,090	3,427	1,320									
ANIAK	8,804	5,905	5,751	7,463	9,332	6,175									
CHUATHBALUK ^a	3,782			1,350	2,280	2,102									
NAPAIMUTE	414			88											
CROOKED CREEK	2,888			597	772	1,760									
RED DEVIL	1,021			2,112	1,153	1,344									
SLEETMUTE	3,689			3,472	1,813	1,574									
STONY RIVER	722			2,270	1,352	597									
LIME VILLAGE				1,141	2,100	2,250									
MCGRATH	792			367	2,258	1,833									
TAKOTNA				300	250	128									
MEDFRA															
NIKOLAI				2,644	1,178	829									
TELIDA					15										
QUINHAGAK	901	808	1,084	724	1,262	2,620									
GOODNEWS BAY	339	188	371	405	609	342									
PLATINUM	9	3	207	43	140	125									
Mekoryuk				501 ^b	8,402	8,892									
Tununak				893 ^b	86	65									
Toksok Bay				2,484 ^b	203	200									
Newtok				72 ^b	40	4									
Nightmute				728 ^b	30	35									
TOTAL	96,791	142,930 ^a	70,709 ^a	122,858	132,858	108,556									

^a Estimated total based on sampled villages.^b Chum and sockeye salmon harvest combined.

Appendix A.7

Mean salmon weights and prices paid to commercial fisherman
in the Kuskokwim Area, 1967 - 1990.

Year	Mean Weight - Pounds					Average Price - \$/Pound				
	Chinook	Sockeye	Coho	Pink	Chum	Chinook	Sockeye	Coho	Pink	Chum
1967	27.8	7.4	5.9	a	7.0	0.13	0.05	0.09	a	0.04
1968	23.8	6.2	7.2	4.0	7.9	0.16	0.10	0.09	0.05	0.04
1969	19.6	6.2	7.3	3.6	5.8	0.19	0.15	0.10	0.06	0.07
1970	18.9	5.4	7.3	3.3	6.1	0.20	0.21	0.14	0.08	0.08
1971 ^b	26.2	6.9	6.1	a	6.4	0.17	0.10	0.13	a	0.08
1972	a	a	a	a	a	0.20	a	0.16	a	0.08
1973	a	a	a	a	a	0.25	a	0.26	a	0.19
1974	a	a	a	a	a	0.46	0.34	0.27	0.23	0.25
1975	a	a	a	a	a	0.54	a	0.31	a	0.26
1976 ^c	17.0	6.7	7.8	3.5	7.0	0.64	0.43	0.40	0.25	0.27
1977	22.7	8.3	7.8	3.9	7.3	1.15	0.45	0.65	0.25	0.45
1978	24.2	6.5	7.1	3.9	8.9	0.50	0.49	0.40	0.12	0.32
1979	16.6	6.9	7.9	3.9	7.0	0.66	0.53	0.75	0.11	0.37
1980	14.1	6.7	6.9	3.6	6.4	0.47	0.31	0.64	0.12	0.24
1981	17.8	7.2	6.4	3.5	7.5	0.84	0.61	0.63	0.11	0.23
1982	19.3	7.2	7.3	3.6	7.3	0.82	0.41	0.53	0.05	0.22
1983	18.8	6.8	6.8	3.5	7.4	0.54	0.51	0.39	0.05	0.33
1984	16.4	6.6	7.7	3.2	6.7	0.89	0.52	0.55	0.07	0.28
1985	17.0	7.0	7.5	3.6	7.1	0.71	0.59	0.51	0.05	0.25
1986	17.0	7.2	6.4	3.4	6.8	0.80	0.70	0.60	0.05	0.25
1987	15.2	7.5	7.2	3.7	6.8	1.10	1.30	0.73	0.10	0.27
1988	15.1	7.3	7.5	3.4	8.1	1.30	1.42	1.25	0.15	0.40
1989	16.6	7.2	7.3	3.4	6.8	0.75	1.20	0.55	0.05	0.26
1990	15.1	6.7	6.5	3.2	6.9	0.56	1.05	0.75	0.12	0.26
Ten Year Average (1980-89)	16.7	7.1	7.1	3.5	7.1	0.82	0.76	0.64	0.08	0.27

^a Information unavailable.

^b Information was not available for district 5.

^c Information was not available for district 4.

Species		
Code	Genus and Species	Common Name
110	<i>Gadus macrocephalus</i>	Pacific Cod
113	<i>Eleginus gracilis</i>	Saffron Cod
121	<i>Platichthys stellatus</i>	Starry Flounder
122	<i>Liopsetta glacialis</i>	Arctic Flounder
127	<i>Limanda aspera</i>	Yellowfin Sole
128	<i>Parophrys vetulus</i>	English Sole
162	<i>Cottus cognatus</i>	Slimy Sculpin
166	<i>Oligocottus maculosus</i>	Tidepool Sculpin
192	<i>Hexagrammos stelleri</i>	Whitespotted Greenling
200	<i>Hippoglossus stenolepis</i>	Pacific Halibut
230	<i>Clupea harengus pallasii</i>	Pacific Herring
410	<i>Oncorhynchus tshawytscha</i>	Chinook Salmon
420	<i>Onchornynchus nerka</i>	Sockeye Salmon
430	<i>Onchornynchus kisutch</i>	Coho Salmon
440	<i>Onchornynchus gorbusha</i>	Pink Salmon
450	<i>Onchornynchus keta</i>	Chum Salmon
500	<i>Esox lucius</i>	Northern Pike
513	<i>Osmerus mordax</i>	Rainbow Smelt
514	<i>Hypomesus olidus</i>	Pond Smelt
516	<i>Mallotus villosus</i>	Capelin
520	<i>Salvelinus alpinus</i>	Arctic Char
532	<i>Salvelinus malma</i>	Dolly Varden (none anadromous)
541	<i>Onchornynchus mykiss</i>	Rainbow Trout
550	<i>Salvelinus namaycush</i>	Lake Trout
570	<i>Stenodus leucichthys</i>	Inconnu
581	<i>Coregonus nasus</i>	Broad Whitefish
582	<i>Coregonus pidschian</i>	Humpback Whitefish
583	<i>Coregonus sardinella</i>	Least Cisco
584	<i>Coregonus autumnalis</i>	Arctic Cisco
585	<i>Prosopium cylindraceum</i>	Round Whitefish
590	<i>Lota lota</i>	Burbot
600	<i>Lampetra tridentata</i>	Pacific Lamprey
601	<i>Lampetra japonica</i>	Arctic Lamprey
610	<i>Thymallus arcticus</i>	Arctic Grayling
630	<i>Dallia pectoralis</i>	Alaska Blackfish
640	<i>Catostomus catostomus</i>	Longnose Sucker
660	<i>Gasterosteus aculeatus</i>	Threespine Stickleback
661	<i>Pungitius pungitius</i>	Ninespine Stickleback
670	<i>Percopsis omiscomaycus</i>	Trout Perch
NA	<i>Megalocottus platycephalus</i>	Belligerent Sculpin
NA	<i>Myoxocephalus quadricornis</i>	Fourhorn Sculpin

^a Based on American Fisheries Society Special Publication No. 12, A List of Common and Scientific Names of Fishes from the United States and Canada (Fourth Edition). Committee and Names of Fishes, Bethesda, Maryland, 1980.

Appendix A.9

Kuskokwim River distances^a.

	Distance from the Mouth		Distance from Bethel	
	<u>Kilometer</u>	<u>Miles</u>	<u>Kilometer</u>	<u>Miles</u>
Popokamiut (Lower boundry District 1)	-3	-2	-129	-80
Kuskokwim River Mouth 60.80 N, 162.42 W	0	0	-125	-78
Eek Island, Southernmost tip, (Lower boundry District 1)	19	12	-106	-66
Apokak Slough (Lower boundry District 1)	35	22	-90	-56
Eek River	39	24	-87	-54
Kwegooyuk	42	26	-84	-52
Kinak River	48	30	-78	-48
Tuntutuliak Village	56	35	-87	-54
Kialik River	59	37	-66	-41
Fowler Island	83	52	-42	-26
Johnson River	93	58	-32	-20
Napakiaak Village	104	65	-21	-13
Napaskiak Village	115	71	-12	-7
Oscarville Village	115	71	-11	-7
Bethel City	125	78	0	0
Gweek River	145	90	20	12
Kwethluk Village	159	99	34	21
Akiachak Village	169	105	43	27
Kasigluk River	173	108	48	30
Kisaralik River	175	109	50	31
Akiak Village	190	118	64	40
Mishevik Slough,	212	132	87	54
Tuluksak Village	218	136	93	58
Bogus Creek (Boundry of District 1)	234	146	109	68
High Bluffs (Boundry of District 2)	264	164	139	86
Mud Creek Slough	297	185	172	107
Kalskag Village	309	192	184	114
Aniak Village, Aniak River	362	225	237	147
Chuathbaluk Village (Upper boundry District 2)	375	233	250	155
Kolmakof River	395	246	270	168
Napamiut Village	410	255	285	177
Holokuk River	415	258	290	180
Oskawalik River	449	279	324	201
Crooked Creek Village	466	290	341	212
Georgetown Village, George River	497	309	372	231
Red Devil Village	526	327	401	249
Sleetmute village	539	335	414	257
Holitna River	540	336	415	258

-continued-

	Distance from the Mouth		Distance from From Bethel	
	<u>Kilometer</u>	<u>Miles</u>	<u>Kilometer</u>	<u>Miles</u>
Stony River Village	585	364	460	286
Stony River	587	365	462	287
Swift River	611	380	486	302
Tatlawiksuk River	616	383	491	305
Devil's Elbow	645	401	520	323
Vinasale	740	460	615	382
McGrath Village	815	507	690	429
Middle Fork	889	553	764	475
Big River	801	560	776	482
Pitka Fork	920	572	795	494
Medra Village	928	577	803	499
South Fork	931	579	806	501
East Fork	943	586	818	508
North Fork	943	586	818	508
Nikolai Village	999	621	874	543
Swift Fork	1,136	706	1,011	628
Telida Village	1,184	736	1,059	658
Highpower Creek	1,200	746	1,075	668
Fish Creek	1,284	798	1,159	720
North Fork Lake	1,334	829	1,209	751
Top of Kuskokwim Drainage	1,498	931	1,373	853

- a These distances were taken from the USGS 1:36,300 series of topographic maps. The "mouth" was defined as the point where the "grassland" banks are 24 miles apart. Some locations are not on the mainstem of the Kuskokwim River, as a result their mileages appear to be out of sequence since they are listed in the order of the turn off.

Appendix A.10

Kuskokwim Area subsistence sockeye salmon harvest by village, 1985 - 1990.

VILLAGE	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
KIPRUK					402	175									
KWIGILLINGOK															
KONGIGANAK	130			664	603	264									
TUNTUTULIAK	1,498	288	991	565	1,018	955									
EEK	241			302	168	1,212									
KASIGLUK	1,138			296	231	732									
NUNAPITCHUK	1,447	905	1,187	640	987	702									
ATMAUTLUAK	1,308			252	1,129	1,121									
NAPAKIAK	1,242		1,439	689	1,722	1,070									
NAPASKIAK	1,181		2,199	855	620	894									
OSCARVILLE	942		745	1,752	329	122									
BETHEL	3,409	7,730	3,810	4,357	5,712	5,892									
KWETHLUK	5,584	5,423	3,845	3,592	2,443	3,234									
AKIACHAK	3,182		3,532	2,870	2,584	2,115									
AKIAK	1,368		1,883	1,203	1,301	1,393									
TULUKSAK	1,620		1,733	1,235	2,234	991									
LOWER KALSKAG	948	765		1,732	765	662									
UPPER KALSKAG	187	727		321	338	292									
ANIAK	2,116	2,652	2,131	2,613	761	1,194									
CHUATHBALUK*	1,102			102	229	885									
NAPAIMUTE	125			48											
CROOKED CREEK	1,218			254	413	940									
RED DEVIL	205			291	332	408									
SLEETMUTE	1,351			308	776	890									
STONY RIVER	585			210	1,084	685									
LIME VILLAGE				0	5,653	2,100									
MCGRATH	0			146	0	0									
TAKOTNA				0	0	0									
MEDFRA															
NIKOLAI	0			0	0	0									
TELIDA					0	0									
QUINEAGAK	106	423	1,067	857	450	1,544									
GOODNEWS BAY	562	521	834	898	704	905									
PLATINUM	27	55	121	21	151	140									
Mekoryuk				501*	0	417									
Tununak				893*	135	7									
Takook Bay				2,484*	1,066	265									
Newtok				72*	20	3									
Nightmute				728*	70	10									
TOTAL	33,631	19,489*	25,180*	30,259	33,958	32,217									

* Sampled villages only.

* Chum and sockeye salmon harvest combined.

Appendix A.11

Kuskokwim Area subsistence coho salmon harvest by village, 1985 - 1990.

VILLAGE	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
KIPNUK					243	460									
KWIGILLINGOK															
KONGIGANAK	88			917	525	265									
TUNTUTULIAK	371	1,692	760	710	484	759									
EEK	406			261	299	1,703									
KASIGLUK	1,763			713	687	908									
NUNAPITCHUK	513	576	696	651	487	287									
ATMAUTLUAK	326			266	971	322									
NAPAKIAK	836		959	373	1,763	1,506									
NAPASKIAK	415		629	1,148	809	674									
OSCARVILLE	155		40	50	684	34									
BETHEL	6,094	19,351	8,077	6,434	18,594	18,126									
KWETHLUK	3,041	3,545	2,537	3,649	3,307	3,406									
AKIACHAK	967		286	4,653	1,879	915									
AKIAK	1,270		1,294	1,377	2,523	1,715									
TULUKSAK	1,723		337	1,271	1,261	846									
LOWER KALSKAG	596	1,821		173	731	676									
UPPER KALSKAG	105	759		126	688	261									
ANIAK	1,552	1,051	2,302	1,221	2,461	1,094									
CHUATHBALUK ^a	393			216	305	601									
NAPAIMUTE	211			23											
CROOKED CREEK	290			69	536	534									
RED DEVIL	846			448	1,516	794									
SLEETMUTE	1,330			1,266	1,009	859									
STONY RIVER	395			107	611	195									
LIME VILLAGE				1,319	2,025	484									
MCGRATH	143			308	697	1,512									
TAKOTNA				0	40	0									
MEDFRA															
NIKOLAI	550			583	328	55									
TELIDA					60	0									
QUINHAGAK	67	41	125	2,933	3,346	3,510									
GOODNEWS BAY	210	0	0	1,072	819	1,472									
PLATINUM	11	8	43	90	68	90									
Mekoryuk				0 ^b	273	433									
Tununak					86	0									
Toksook Bay					87	19									
Newtok					30	4									
Nightmute						0									
TOTAL	24,667	25,299 ^a	18,085 ^a	34,426	49,988	44,519									

^a Sampled villages only.^b Chum and sockeye salmon harvest combined.

APPENDIX B

Appendix B.1

Associated environmental and catch data, Bethel, Kuskokwim River, 1965-1990^a.

<u>YEAR</u>	<u>RIVER BREAKUP</u>	<u>RIVER CLEAR OF ICE</u>	<u>FIRST REPORTED</u>		<u>RIVER FREEZE-UP</u>
			<u>Chinook Salmon</u>	<u>Smelt</u>	
1965			May 31	May 25	
1966	June 01		June 01 ^b	June 06	Oct. 20
1967	May 06	May 17	May 20	May 25	Oct. 19
1968	May 14	May 17	May 26		
1969	May 06	May 13	May 23		
1970	May 12	May 16	May 21	May 27	Oct. 18
1971	May 24	May 29	June 06	June 07	Nov. 04
1972	May 23	May 28	June 05	June 06	Nov. 03
1973	May 14	May 18	May 27	May 31	Oct. 15
1974	May 07	May 19	May 23	May 25	
1975	May 19	May 25	May 26	May 29	Oct. 29
1976	May 18	May 18	June 01		Oct. 27
1977	May 23	June 01	May 31	June 02	Oct. 18
1978			May 18	May 22	Oct. 25
1979	Apr 27	May 07	May 16		Nov. 19
1980	May 04	May 10	May 17	May 22	
1981	May 09	May 12	May 22	May 06	
1982	May 18	May 22	June 01	June 03	Oct. 30
1983	May 11	May 13	May 23	June 01	Oct. 22
1984	May 13	May 23	May 27	May 27	Oct. 18
1985	May 25	May 29	June 03	June 04	Oct. 22
1986	May 11	May 18	May 28	May 28	Oct. 24
1987	May 17	May 20	May 25 ^c	May 31	Nov. 06
1988	May 11	May 15	May 16		Nov. 14
1989	May 05	May 07	May 26	May 28	Oct. 31
1990			May 20		

^a Environmental data, breakup, clear of ice and freeze-up from National Weather Service

^b Caught at Kalskag

^c Also first chum

Appendix B.2 Comparative chinook salmon catches by fishing period by year
in District 1, Lower Kuskokwim River, 1974 - 1990^a.

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1974	June 10-11	4,384	422	5,064	0.90
	June 13-14	5,790	488	5,957	1.00
	June 17-18	5,857	506	6,072	1.00
Subtotal ^b		16,031	606	16,992	0.90
	June 27	558	267	1,602	0.40
	July 01-02	561	380	4,560	0.08
	July 04-05	196	282	3,384	0.06
	July 08-09	286	376	4,512	0.06
	July 18	31	190	1,140	0.03
Total		17,663	666	32,190	0.50
1975	June 16	359	12	72	5.00
	June 19-20	1,031	46	552	1.90
	June 23-24	17,235	483	5,796	2.90
Subtotal ^b		18,625	541	6,420	2.90
	June 30	691	279	1,674	0.40
	July 03	636	360	2,160	0.30
	July 07	421	369	2,214	0.20
	July 10	195	304	1,824	0.10
	July 14	179	326	1,956	0.10
Total		20,747	539	16,248	1.20
1976	June 17	6,962	459	2,754	2.50
	June 21	13,048	495	2,970	4.40
Subtotal ^b		20,010	561	5,724	3.40
	June 28	4,143	348	2,088	2.00
	July 01	1,550	415	2,490	0.60
	July 08	894	381	2,286	0.40
	July 12	377	344	2,262	0.20
	July 15	236	265	1,590	0.10
Total		27,177	517	16,440	1.70

- Continued -

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1977	June 15	12,458	467	2,802	4.50
	June 20	16,227	484	2,904	5.60
Subtotal ^b		28,685	563	5,706	5.00
	June 27	1,337	378	2,268	0.60
	June 30	504	409	2,454	0.20
	July 04	266	331	1,986	0.10
	July 07	407	368	2,208	0.20
	July 14	153	385	2,310	0.06
Total		31,352	653	16,932	1.80
<hr/>					
1978	June 09	7,590	509	3,054	2.50
	June 14	6,142	266	1,596	3.90
	June 16	12,341	396	2,376	5.20
	June 22	1,724	72	288	6.00
	June 23	8,342	429	1,716	4.90
Subtotal ^b		36,139	615	9,030	4.00
	June 26	1,964	499	2,694	0.70
	June 29	1,759	422	2,652	0.70
	July 03	894	476	2,856	0.30
	July 06	1,460	485	5,820	0.30
	July 10	694	428	5,136	0.10
	July 10	293	422	2,532	0.10
Total		43,203	617	30,720	1.40
<hr/>					
1979	June 11	12,270	523	3,138	3.90
	June 15	12,363	549	3,294	3.80
Subtotal ^b		24,633	591	6,432	3.80
	June 22	5,651	502	3,012	1.90
	June 26	2,277	531	3,186	0.70
	June 29	1,583	542	3,252	0.30

- Continued -

Appendix B.2 (page 3 of 7)

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1979	July 03	1,233	542	3,252	0.40
	July 10	470	520	3,120	0.20
	Total	35,847	617	22,254	1.60
<hr/>					
1980	June 12	9,891	469	2,814	3.50
	June 18	16,921	468	2,808	6.00
Subtotal ^b		26,812	553	5,622	4.80
	June 23	4,777	426	2,616	1.80
	June 26	1,460	408	2,448	0.60
	July 02	498	383	2,298	0.20
	July 09	445	431	2,586	0.20
Total		33,992	597	15,570	2.20
<hr/>					
1981	June 10	11,897	489	2,934	4.10
	June 16	17,985	541	3,246	5.50
Subtotal ^a		29,882	589	6,180	4.80
	June 22	3,830	511	3,066	1.25
	June 25	2,000	508	3,048	0.66
	June 30	2,563	484	2,904	0.88
	July 02	1,707	459	2,754	0.62
	July 06	1,088	461	2,766	0.39
	July 09	491	440	2,640	0.37
Total		42,011	613	23,358	1.80
<hr/>					
1982	June 14	4,912	464	2,784	1.80
	June 17	11,285	496	2,892	3.80
	June 21	13,343	499	2,994	4.50
	June 24	8,548	459	1,836	4.70
Subtotal ^b		38,088	610	10,506	3.60

- Continued -

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1982	June 28	1,943	352	1,408	1.38
	June 30	2,064	483	1,932	1.07
	July 02	1,095	434	1,736	0.63
	July 05	875	372	2,232	0.39
	July 08	748	435	2,610	0.29
	July 12	307	354	2,124	0.14
Total		45,120	610	22,548	2.00
<hr/>					
1983	June 13	7,445	489	2,934	2.54
	June 16	5,961	450	2,700	2.21
Subtotal ^b		13,406	544	5,634	2.38
	June 20	4,776	474	2,844	1.68
	June 23	3,287	450	2,700	1.22
	June 27	2,566	446	2,676	0.96
	June 30	2,359	547	3,282	0.72
	July 04	1,213	443	2,658	0.46
	July 07	1,202	496	2,976	0.40
	July 11	633	466	2,796	0.23
Total		16,036	619	25,566	0.63
<hr/>					
1984	June 18	10,845	484	2,904	3.73
	June 21	6,336	443	2,658	2.38
Subtotal		17,181	520	5,562	3.08
	June 25	3,018	466	2,796	1.08
	June 28	2,625	470	2,820	0.93
	July 02	1,988	483	2,898	0.69
	July 05	1,218	426	2,556	0.48
	July 09	1,211	496	2,976	0.41
	July 12	858	436	2,616	0.33
	July 16	744	373	2,238	0.33
Total		28,843	587	24,462	1.18

-Continued-

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1985	June 20	6,519	423	2,538	2.07
	June 24	10,413	488	2,928	3.56
	June 27	8,791	492	2,952	2.98
	July 01	6,168	514	3,084	2.00
	July 04	3,774	460	2,760	1.37
Total		35,665	598	14,262	11.98
1986	June 26	7,786	514	3,084	2.52
	June 30	4,200	576	3,456	1.22
	July 03	3,224	556	3,336	0.97
	July 07	1,805	586	3,516	0.51
	July 10	1,156	532	3,192	0.36
Total		18,171	631	16,584	5.58
1987	June 18	18,336	526	4,208	4.36
	June 24				
	June 30				
	July 03	5,970	580	3,480	1.72
	July 07	3,636	578	3,468	1.05
	July 11	1,910	597	3,582	0.53
	July 15	1,415	569	3,414	0.41
	July 20	1,227	551	3,306	0.37
	Aug. 06	207	590	3,540	0.06
	Aug. 13	103	604	3,624	0.03
	Aug. 17	76	595	3,570	0.02
Total		4,862	677	17,466	0.28
1988	June 16	12,640	602	4,816	2.62
	June 20	11,708	612	3,672	3.18
	June 24	9,710	644	3,864	2.51
	June 28	5,350	609	3,654	1.46
	July 02	3,531	580	3,480	1.01
	July 05	2,340	579	3,474	0.67
	July 08	1,891	604	3,624	0.52
	July 11	1,628	598	3,588	0.45
	July 14	1,751	597	3,582	0.49
	July 18	1,107	575	3,450	0.32
	July 21	621	539	3,234	0.19
	July 25	329	494	2,964	0.11
	July 28	333	552	3,312	0.10
	Aug 01	201	594	3,564	0.06

-Continued-

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1988	Aug 04	206	639	3,834	0.05
	Aug 08	114	640	3,840	0.03
	Aug 10	73	596	3,576	0.02
	Aug 12	115	624	3,744	0.03
	Aug 15	76	613	3,678	0.02
	Aug 18	37	620	3,720	0.01
	Aug 20	29	577	3,462	0.01
	Aug 27	14	532	3,192	0.00
	Aug 31	56	412	2,472	0.02
Total		53,860	746	81,796	0.66

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1989	June 19	9,204	374	2,988	3.08
	June 23	6,011	277	2,218	2.71
	June 26	1,862	126	1,006	1.85
	June 30	9,232	642	5,129	1.80
	July 03	4,600	629	3,770	1.22
	July 05	3,311	553	3,311	1.00
	July 08	3,136	621	3,733	0.84
	July 11	1,691	616	3,676	0.46
	July 14	1,216	590	3,576	0.34
	July 18	868	437	2,630	0.33
	July 27	210	562	3,364	0.06
	Aug 03	174	679	5,432	0.03
	Aug 07	78	642	3,853	0.02
	Aug 09	40	644	3,864	0.01
	Aug 12	34	650	3,900	0.01
	Aug 15	25	616	3,697	0.01
	Aug 18	7	381	2,284	0.00
	Aug 23	19	528	3,167	0.01
	Aug 26	17	508	4,063	0.00
	Aug 29	7	423	3,388	0.00
	Sept 01	3	194	1,421	0.00
Total		41,745	745	70,470	0.66

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>		<u>CATCH PER</u>
			<u>FISHERMEN</u>	<u>HOURS</u>	<u>HOURL (CPUE)</u>
1990	June 20	16,690	630	3,780	4.42
	June 25	16,031	611	3,666	4.37
	June 29	9,428	645	3,870	2.44
	July 05	4,071	591	3,546	1.15
	July 09	2,804	589	3,534	0.79
	July 14	2,127	625	5,000	0.43
	Aug 01	252	611	3,666	0.07
	Aug 06	306	631	3,786	0.08
	Aug 10	94	653	3,918	0.02
	Aug 13	38	642	3,852	0.01
	Aug 16	28	650	5,850	0.00
	Aug 20	11	594	3,564	0.00
	Aug 27	3	534	3,204	0.00
Total		51,883	743	51,234	0.84

a The catch totals exclude small numbers of chinook salmon taken in late July and August.

b Unrestricted mesh size.

Appendix B.3 Comparative sockeye salmon catches by fishing period by year
in District 1, Lower Kuskokwim River, 1981 - 1990^a.

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1981	June 10	48	489	2,934	0.02
	June 16	316	541	3,246	0.10
	June 22	3,852	511	3,066	1.26
	June 25	6,037	508	3,048	1.98
	June 30	12,262	484	2,904	4.22
	July 02	9,769	459	2,754	3.55
	July 06	5,510	461	2,766	1.99
	July 09	7,760	440	2,640	2.94
Total		45,554	613	23,358	1.95
1982	June 14	321	464	2,784	0.12
	June 17	1,061	496	2,892	0.37
	June 21	2,432	499	2,994	0.81
	June 24	3,157	459	1,836	1.72
	June 28	9,938	352	1,408	7.06
	June 30	5,824	483	1,932	3.01
	July 02	3,110	434	1,736	1.79
	July 05	2,769	372	2,232	1.24
	July 08	1,786	435	2,610	0.68
	July 12	638	354	2,124	0.30
Total		31,036	610	22,548	1.38
1983	June 13	114	489	2,934	0.04
	June 16	156	450	2,700	0.06
	June 20	3,289	474	2,844	1.16
	June 23	4,807	450	2,700	1.78
	June 27	10,465	446	2,676	3.91
	June 30	12,490	547	3,282	3.81
	July 04	24,540	443	2,658	9.23
	July 07	7,286	496	2,976	2.45
	July 11	3,001	466	2,796	1.07
Total		66,148	619	25,566	2.59

-Continued-

Appendix B.3 (page 2 of 4)

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1984	June 18	409	484	2,904	0.14
	June 21	2,618	443	2,658	0.98
	June 25	10,743	466	2,796	3.84
	June 28	10,942	470	2,820	3.88
	July 02	8,145	483	2,898	2.81
	July 05	6,798	426	2,556	2.66
	July 09	2,821	496	2,976	0.95
	July 12	2,188	436	2,616	0.84
	July 16	1,121	373	2,238	0.50
Total		45,785	587	24,462	1.87
1985 ^b	June 20	5,246	423	2,538	2.07
	June 24	25,536	488	2,928	8.72
	June 27	26,155	492	2,952	8.86
	July 01	31,082	514	3,084	10.08
	July 04	16,114	460	2,760	5.84
Total		104,133	598	14,262	7.30
1986 ^b	June 26	40,468	514	3,084	13.12
	June 30	22,633	576	3,456	6.55
	July 03	15,766	556	3,336	4.73
	July 07	8,347	586	3,516	2.37
	July 10	5,488	532	3,192	1.72
Total		92,702	631	16,584	5.59
1987	June 18	9,102	526	4,208	2.16
	June 24	24,355	607	4,856	5.02
	June 30	39,112	564	4,512	8.67
	July 03	44,030	580	3,480	12.65
	July 07	9,196	578	3,468	2.65
	July 11	4,611	597	3,582	1.29
	July 15	2,301	569	3,414	0.67
	July 20	774	551	3,306	0.23
Total		99,250	677	32,496	3.05

-Continued-

Appendix B.3 (page 3 of 4)

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1988	June 16	7,408	602	4,816	1.53
	June 20	14,502	612	3,672	3.95
	June 24	19,894	644	3,864	5.15
	June 28	17,628	609	3,654	4.82
	July 02	15,102	580	3,480	4.34
	July 05	7,284	579	3,474	2.10
	July 08	3,623	604	3,624	1.00
	July 11	2,467	598	3,588	0.69
	July 14	822	597	3,582	0.23
	July 18	396	575	3,450	0.11
	July 21	164	539	3,234	0.05
	July 25	109	494	2,964	0.37
	July 28	70	552	3,312	0.21
	Aug 01	32	594	3,564	0.01
	Aug 04	105	639	3,834	0.27
	Aug 08	92	640	3,840	0.02
	Aug 10	9	596	3,576	0.00
	Aug 12	11	624	3,744	0.00
	Aug 15	14	613	3,678	0.00
	Aug 18	8	620	3,720	0.00
	Aug 20	5	577	3,462	0.00
	Aug 27	8	532	3,192	0.00
	Aug 31	10	410	2,460	0.00
Total		89,763	746	81,784	1.10
1989	June 19	5,495	374	2,988	1.84
	June 23	7,011	277	2,218	3.16
	June 26	3,746	126	1,006	3.72
	June 30	10,214	642	5,129	1.99
	July 03	5,808	629	3,770	1.54
	July 05	2,917	553	3,311	0.88
	July 08	3,177	621	3,733	0.85
	July 11	1,565	616	3,676	0.42
	July 14	796	590	3,576	0.22
	July 18	451	437	2,630	0.17
Total		41,388	745	70,470	0.59
1990	June 20	10,318	630	3,780	2.73
	June 25	27,024	611	3,666	7.37
	June 29	18,774	645	3,870	4.85
	July 05	10,759	591	3,546	3.03
	July 09	8,757	589	3,534	2.48
	July 14	5,467	625	5,000	1.09
	Aug 01	533	611	3,666	0.15
	Aug 06	133	631	3,786	0.04

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
	Aug 10	94	653	3,918	0.02
	Aug 13	38	642	3,852	0.01
	Aug 16	29	650	5,850	0.00
	Aug 20	11	594	3,564	0.00
	Aug 27	3	534	3,204	0.00
Total		81,958	743	51,236	1.33

a The catch totals exclude small numbers of chinook salmon taken in late July and August.

b Unrestricted mesh size.

Appendix B.4

Comparative chum salmon catches by fishing period by year in
District 1, Lower Kuskokwim River, 1971 - 1990.

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1971	June 28-29	11,386	150	180	6.30
	July 01-02	8,949	111	1,332	6.70
	July 05-06	17,672	104	1,248	14.20
	July 08-09	12,603	93	1,116	11.30
	July 12-13	2,550	18	216	11.80
	July 15-16	8,000	69	828	9.70
	July 19-20	5,989	71	852	7.00
Totals		67,149	216	7,392	9.10
1972	June 29-30	9,863	87	1,044	9.40
	July 03-04	19,084	115	1,380	13.80
	July 06-07	19,839	101	1,212	16.40
	July 10-11	13,972	113	1,356	10.30
	July 13-14	6,290	80	960	6.60
Totals		69,048	176	5,952	11.60
1973	June 25-26	19,073	202	2,424	7.90
	June 28-29	47,258	250	6,000	7.90
	July 02-03	21,410	242	2,904	7.40
	July 05-06	31,056	212	2,544	12.20
	July 09-10	24,593	217	2,604	9.40
Totals		143,390	341	16,476	8.70
1974	June 27	27,017	267	1,602	16.90
	July 01-02	55,356	380	4,560	12.10
	July 04-05	27,211	282	3,384	8.00
	July 08-09	50,672	376	4,512	11.20
	July 18	6,661	190	1,140	5.84
Totals		166,917	467	15,198	11.00
1975	June 30	31,216	279	1,674	18.60
	July 03	35,525	360	2,160	16.00
	July 07	39,369	396	2,214	17.80

-Continued-

Appendix B.4 (page 2 of 6)

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1975	July 10	39,910	304	1,824	21.90
	July 14	21,092	326	1,956	10.80
Totals		167,112	539	9,828	17.00
1976	June 28	42,464	348	2,088	20.30
	July 01	44,024	415	2,490	17.70
	July 08	48,669	381	2,286	21.30
	July 12	21,153	377	2,262	9.40
	July 15	14,176	265	1,590	8.90
Totals		170,486	517	10,716	15.90
1977	June 27	40,321	378	2,268	17.80
	June 30	58,884	409	2,454	24.00
	July 04	37,500	331	1,986	18.90
	July 07	56,943	368	2,208	25.80
	July 14	24,765	385	2,310	10.70
Totals		218,413	522	11,226	19.50
1978	June 26	44,296	449	2,694	16.40
	June 29	36,793	442	2,652	13.90
	July 03	26,629	476	2,856	9.30
	July 06	48,031	485	5,820	8.30
	July 10	48,931	428	5,136	9.50
	July 13	14,935	422	2,532	5.90
Totals		219,615	617	21,690	10.10
1979	June 22	32,295	502	3,012	10.70
	June 26	53,648	531	3,186	16.80
	June 29	48,643	542	3,252	14.90
	July 03	83,164	542	3,252	25.60
	July 10	32,434	520	3,120	10.40
Totals		250,184	617	15,822	15.80

-Continued-

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1980	June 23	105,825	436	2,616	40.50
	June 26	131,945	408	2,448	53.90
	July 02	122,613	383	2,298	53.40
	July 09	90,233	431	2,586	34.90
Totals		450,616	579	9,948	45.20
1981	June 22	78,168	511	3,066	25.50
	June 25	81,431	508	3,048	26.70
	June 30	51,942	484	2,904	17.90
	July 02	58,594	459	2,754	21.30
	July 06	55,799	461	2,766	20.20
	July 09	66,138	440	2,640	25.00
Totals		392,072	613	17,178	22.80
1982	June 28	58,528	352	1,408	41.60
	June 30	47,773	483	1,932	24.70
	July 02	38,918	434	1,736	22.40
	July 05	29,315	372	2,232	13.10
	July 08	28,942	435	2,610	11.90
	July 12	20,709	354	2,124	9.80
Totals		224,185	576	12,042	18.60
1983	June 20	28,915	474	2,844	10.20
	June 23	24,625	450	2,700	9.10
	June 27	44,802	446	2,676	16.70
	June 30	55,209	547	3,282	16.80
	July 04	46,176	443	2,658	17.40
	July 07	36,965	496	2,976	12.40
	July 11	20,560	466	2,769	7.40
Totals		257,252	619	19,905	12.90
1984	June 25	91,773	466	2,796	32.80
	June 28	67,120	470	2,820	23.80
	July 02	69,897	483	2,898	24.10

-Continued-

Appendix B.4 (page 4 of 6)

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1984	July 05	54,981	426	2,556	21.50
	July 09	36,440	496	2,976	12.10
	July 12	24,269	436	2,616	9.30
	July 16	18,613	373	2,238	8.30
Totals		363,093	587	18,900	19.20
1985	June 20	19,762	423	2,538	7.79
	June 24	42,778	488	2,928	14.61
	June 27	47,443	492	2,952	16.07
	July 01	47,471	514	3,084	15.39
	July 04	28,581	460	2,760	10.36
Total		186,035	598	14,262	13.04
1986	June 26	68,947	514	3,084	22.36
	June 30	60,780	576	3,456	17.59
	July 03	65,839	556	3,336	19.74
	July 07	55,983	586	3,516	15.92
	July 10	48,990	532	3,192	15.35
Total		92,702	631	16,584	18.12
1987	June 18	14,137	526	4,208	3.36
	June 24	54,454	607	4,856	11.21
	June 30	112,963	564	4,512	25.04
	July 03	66,783	580	3,480	19.19
	July 07	103,059	578	3,468	29.72
	July 11	72,118	597	3,582	20.13
	July 15	71,923	569	3,414	21.07
	July 20	62,044	551	3,306	18.77
	Aug. 08	4,074	590	3,540	1.15
	Aug. 13	894	604	3,624	0.25
Total		561,784	677	37,990	14.79
1988	June 16	72,219	602	4,816	15.00
	June 20	113,628	612	3,672	30.94
	June 24	119,808	644	3,864	31.00
	June 28	154,027	609	3,654	42.15
	July 02	187,916	580	3,480	54.00
	July 05	163,971	579	3,474	47.20
	July 08	138,772	604	3,624	38.20

-Continued-

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1988	July 11	137,450	598	3,588	38.31
	July 14	116,930	597	3,582	32.64
	July 18	57,749	575	3,450	16.73
	July 21	39,643	539	3,234	12.25
	July 25	24,893	494	2,964	8.40
	July 28	16,028	552	3,312	4.50
	Aug 01	6,967	594	3,564	1.95
	Aug 04	5,152	639	3,834	1.34
	Aug 08	2,890	640	3,840	0.75
	Aug 10	1,376	596	3,576	0.38
	Aug 12	1,422	624	3,744	0.38
	Aug 15	663	613	3,678	0.18
	Aug 18	330	620	3,720	0.09
	Aug 20	121	577	3,462	0.03
	Aug 27	93	532	3,192	0.03
	Aug 31	2,585	412	2,472	1.05
Total		1,364,533	746	81,796	16.68
1989	June 19	41,789	374	2,988	13.97
	June 23	65,650	277	2,218	29.63
	June 26	32,373	126	1,006	32.12
	June 30	131,629	642	5,129	26.63
	July 03	91,345	629	3,770	24.20
	July 05	85,727	553	3,311	25.84
	July 08	119,066	621	3,733	31.96
	July 11	78,053	616	3,676	21.12
	July 14	44,401	590	3,576	12.54
	July 18	26,407	437	2,630	10.07
	July 27	5,716	562	3,364	1.70
	Aug 03	3,615	679	5,432	0.67
	Aug 07	868	642	3,853	0.23
	Aug 09	432	644	3,864	0.11
	Aug 12	122	650	3,900	0.03
	Aug 15	119	616	3,697	0.03
	Aug 18	16	381	2,284	0.01
	Aug 23	21	528	3,167	0.01
	Aug 26	15	508	4,063	0.00
	Aug 29	21	423	3,388	0.01
	Sept 01	7	194	1,421	0.01
Total		727,392	745	70,470	10.32

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1990	June 20	30,306	630	3,780	8.02
	June 25	58,944	611	3,666	16.08
	June 29	74,911	645	3,870	19.36
	July 05	86,835	591	3,546	24.49
	July 09	91,411	589	3,534	25.87
	July 14	79,803	625	5,000	15.96
	Aug 01	9,065	611	3,666	2.47
	Aug 06	4,597	631	3,786	1.21
	Aug 10	1,269	653	3,918	0.32
	Aug 13	509	642	3,852	0.13
	Aug 16	239	650	5,850	0.04
	Aug 20	113	594	3,564	0.03
	Aug 27	25	534	3,204	0.01
Total		438,027	743	51,236	7.10

Appendix B.5 Lower Kuskokwim River, District 1, and the middle Kuskokwim River, District 2, combined commercial salmon harvest, 1960-1990.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1960	5,969	0	2,498	0	0	8,467
1961	18,918	0	5,044	0	0	23,962
1962	15,341	0	12,432	0	0	27,773
1963	12,016	0	15,660	0	0	27,676
1964	17,149	0	28,613	0	0	45,762
1965	21,989	0	12,191	0	0	34,180
1966	25,545	0	22,985	0	0	48,530
1967	29,986	0	56,313	0	148	86,447
1968	34,278	0	127,306	0	187	161,771
1969	43,997	322	83,765	0	7,165	135,249
1970	39,290	117	38,601	44	1,664	79,716
1971	40,274	2,606	5,253	0	68,914	117,047
1972	39,454	102	22,579	8	78,619	140,762
1973	32,838	369	130,876	33	148,746	312,862
1974	18,664	136	147,269	84	171,887	338,040
1975	21,720	23	81,945	10	181,840	285,538
1976	30,735	2,971	88,501	133	177,864	300,204
1977	35,830	9,379	241,364	203	248,721	535,497
1978	45,641	733	213,393	5,832	248,656	514,255
1979	38,966	1,054	219,060	78	261,874	521,032
1980	35,881	360	222,012	803	483,211	742,267
1981	47,663	48,375	211,251	292	418,677	726,258
1982	48,234	33,154	447,117	1,748	278,306	808,559
1983	33,174	68,855	196,287	211	267,698	566,225
1984	31,742	48,575	623,447	2,942	423,718	1,130,424
1985	37,889	106,647	335,606	75	199,478	679,695
1986	19,414	95,433	659,988	3,422	309,213	1,087,470
1987	36,179	136,602	399,467	43	574,336	1,146,627
1988	55,716	92,025	524,296	10,825	1,381,674	2,064,536
1989	43,217	42,747	479,856	464	749,182	1,315,466
1990	53,759	84,870	410,332	3,397	461,624	1,013,982
Ten Year						
Average	38,910	67,277	409,932	3,948 ^a	508,550	1,026,753
(1980-1989)						

^a Even years only.

Appendix B.6 Kuskokwim River chum salmon return per spawner index,
1980 -1990.

Brood Year	Escapement Index ^a	Return Index by Age ^b					Return ⁽¹⁾ Spawner Index
		3	4	5	6	Total	
1980	1,220,366	4,766	508,267	186,741	2,490	702,264	.6
1981	624,921	4,584	101,382	82,663	5,885	194,514	.3
1982	440,430	2,039	316,256	290,797	13,738	622,830	1.4
1983	123,866	1,546	335,913	282,261			
1984	316,745	10,788	1,192,119				
1985	235,987	13,114					
1986	224,315						
1987	not available						

^a Aniak Sonar index plus Kogrukluk Weir estimate.

^b Based on District 1 commercial catch.

Appendix B.7

Kuskokwim River chinook salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-90.

Date	CPUE							Percent						
	1984	1985	1986	1987	1988	1989	1990	1984	1985	1986	1987	1988	1989	1990
06/01						0.0	0.0						0.0	0.0
06/02	0.0	0.0	0.0	0.0	3.0	0.0	2.1	0.0	0.0	0.0	0.0	0.8	0.0	0.5
06/03	0.0	0.0	0.0	0.0	3.0	0.0	2.1	0.0	0.0	0.0	0.0	0.8	0.0	0.5
06/04	0.0	0.0	0.0	0.0	3.0	0.0	2.8	0.0	0.0	0.0	0.0	0.8	0.0	0.6
06/05	1.4	0.0	0.0	5.1	4.8	0.0	4.2	0.5	0.0	0.0	0.9	1.3	0.0	0.9
06/06	1.4	0.0	0.0	8.4	4.8	0.0	5.7	0.5	0.0	0.0	1.4	1.3	0.0	1.3
06/07	2.6	0.0	0.0	12.9	7.6	1.7	8.4	0.9	0.0	0.0	2.2	2.1	0.3	1.9
06/08	2.6	0.0	0.0	29.3	29.7	8.2	12.6	0.9	0.0	0.0	5.0	8.2	1.6	2.8
06/09	2.6	0.0	2.9	38.4	44.1	16.8	17.2	0.9	0.0	1.5	6.6	12.2	3.2	3.9
06/10	2.6	0.0	4.4	58.8	49.4	32.1	25.3	0.9	0.0	2.2	10.1	13.7	6.1	5.7
06/11	3.3	0.0	5.8	76.6	70.8	36.4	39.2	1.2	0.0	2.9	13.2	19.6	6.9	8.9
06/12	7.1	0.0	10.3	98.4	89.0	45.0	52.8	2.6	0.0	5.2	16.9	24.7	8.6	11.9
06/13	11.0	0.0	10.3	111.8	100.0	56.4	58.4	4.0	0.0	5.2	19.2	27.7	10.8	13.2
06/14	14.6	0.0	11.6	132.8	103.0	83.5	60.9	5.4	0.0	5.8	22.8	28.5	15.9	13.8
06/15	18.3	0.0	11.6	142.9	111.0	102.2	69.5	6.7	0.0	5.8	24.6	30.8	19.5	15.7
06/16	25.3	0.0	11.6	154.1	119.2	109.4	81.0	9.3	0.0	5.8	26.5	33.0	20.9	18.3
06/17	35.4	0.0	11.6	207.8	139.8	130.3	87.1	13.0	0.0	5.8	35.7	38.7	24.9	19.7
06/18	43.5	0.0	11.6	221.9	147.0	165.4	100.1	15.9	0.0	5.8	38.1	40.7	31.6	22.6
06/19	55.3	0.0	13.1	234.9	160.4	184.5	125.7	20.3	0.0	6.5	40.4	44.4	35.3	28.4
06/20	64.7	0.0	21.9	253.3	185.2	200.8	134.6	23.7	0.0	10.9	43.5	51.3	38.4	30.4
06/21	76.4	1.4	41.8	276.6	201.1	214.6	146.2	28.0	1.3	20.9	47.5	55.7	41.0	33.0
06/22	83.8	8.0	55.5	306.3	214.3	231.5	164.9	30.7	7.0	27.7	52.6	59.4	44.2	37.2
06/23	111.5	8.0	59.5	332.7	230.6	254.9	174.2	40.8	7.0	29.7	57.2	63.9	48.7	39.3
06/24	125.6	10.6	74.0	341.9	251.8	276.0	197.7	46.0	9.3	37.0	58.7	69.8	52.7	44.6
06/25	132.4	10.6	76.8	379.4	259.6	302.3	231.8	48.5	9.3	38.3	65.2	71.9	57.8	52.3
06/26	146.7	15.1	94.1	399.8	269.8	350.1	262.6	53.7	13.2	47.0	68.7	74.7	66.9	59.3
06/27	150.4	15.1	108.9	425.2	283.9	400.5	275.9	55.1	13.2	54.4	73.1	78.7	76.5	62.3
06/28	157.9	17.6	123.1	439.8	288.8	411.8	300.7	57.8	15.5	61.5	75.6	80.0	78.7	67.9
06/29	164.1	25.9	136.5	458.3	292.1	414.6	322.1	60.1	22.7	68.2	78.7	80.9	79.2	72.7
06/30	171.3	34.5	137.6	470.5	295.0	436.8	322.1	62.7	30.3	68.7	80.9	81.7	83.4	72.7
07/01	173.6	38.3	143.0	485.9	306.9	448.1	323.6	63.5	33.6	71.4	83.5	85.0	85.6	73.1
07/02	180.4	50.5	147.8	495.4	308.1	451.5	333.0	66.0	44.3	73.8	85.1	85.4	86.3	75.2
07/03	191.0	51.8	147.8	498.4	312.9	461.0	350.0	69.9	45.4	73.8	85.6	86.7	88.1	79.0
07/04	193.6	60.5	150.7	506.5	318.2	467.7	369.7	70.9	53.0	75.2	87.0	88.2	89.4	83.5
07/05	199.6	66.9	153.5	513.0	325.8	477.5	375.1	73.1	58.6	76.6	88.2	90.3	91.2	84.7
07/06	207.7	76.3	160.6	522.1	325.8	479.2	380.8	76.0	66.9	80.2	89.7	90.3	91.5	86.0
07/07	216.6	84.7	166.1	536.7	325.8	487.9	388.4	79.3	74.2	82.9	92.2	90.3	93.2	87.7
07/08	221.8	87.5	172.7	536.7	325.8	491.6	402.8	81.2	76.6	86.2	92.2	90.3	93.9	90.9
07/09	230.9	92.8	175.8	538.0	325.8	496.1	407.6	84.5	81.3	87.8	92.4	90.3	94.8	92.0
07/10	233.4	97.9	178.7	541.1	325.8	500.4	407.6	85.5	85.8	89.2	93.0	90.3	95.6	92.0

---- continued ----

Date	CPUE							Percent						
	1984	1985	1986	1987	1988	1989	1990	1984	1985	1986	1987	1988	1989	1990
07/11	238.0	99.3	180.1	543.3	325.8	500.4	407.6	87.1	87.0	89.9	93.3	90.3	95.6	92.0
07/12	240.5	101.7	181.6	545.4	325.8	501.4	411.5	88.0	89.1	90.7	93.7	90.3	95.8	92.9
07/13	242.9	103.2	185.9	547.8	325.8	501.4	413.5	88.9	90.4	92.8	94.1	90.3	95.8	93.4
07/14	250.1	104.6	188.6	548.9	333.7	501.4	415.6	91.6	91.7	94.2	94.3	92.4	95.8	93.8
07/15	250.1	104.6	188.6	548.9	333.7	501.4	417.7	91.6	91.7	94.2	94.3	92.4	95.8	94.3
07/16	250.9	106.5	190.4	548.9	341.4	501.4	419.5	91.9	93.3	95.1	94.3	94.6	95.8	94.7
07/17	251.8	106.5	190.4	551.5	347.0	502.6	421.6	92.2	93.3	95.1	94.8	96.1	96.0	95.2
07/18	251.8	107.4	190.4	551.5	348.8	504.4	421.6	92.2	94.1	95.1	94.8	96.6	96.4	95.2
07/19	251.8	107.4	192.4	565.9	348.8	505.3	421.6	92.2	94.1	96.1	97.2	96.6	96.5	95.2
07/20	256.1	107.4	192.4	566.8	348.8	510.5	421.6	93.8	94.1	96.1	97.4	96.6	97.5	95.2
07/21	260.8	107.4	192.4	568.9	348.8	511.4	421.6	95.5	94.1	96.1	97.8	96.6	97.7	95.2
07/22	262.6	107.4	192.4	568.9	348.8	517.6	425.3	96.1	94.1	96.1	97.8	96.6	98.9	96.0
07/23	262.6	107.4	192.4	572.3	348.8	517.6	425.3	96.1	94.1	96.1	98.3	96.6	98.9	96.0
07/24	264.3	107.4	192.4	572.3	349.9	517.6	427.3	96.8	94.1	96.1	98.3	96.9	98.9	96.5
07/25	266.0	107.4	192.4	572.3	349.9	517.6	427.3	97.4	94.1	96.1	98.3	96.9	98.9	96.5
07/26	266.0	107.4	194.4	572.3	352.0	517.6	431.4	97.4	94.1	97.0	98.3	97.5	98.9	97.4
07/27	266.0	107.4	196.3	576.5	354.0	517.6	431.4	97.4	94.1	98.0	99.1	98.1	98.9	97.4
07/28	266.0	109.4	196.3	576.5	354.0	517.6	433.4	97.4	95.9	98.0	99.1	98.1	98.9	97.9
07/29	266.8	109.4	200.3	576.5	354.0	517.6	437.5	97.7	95.9	100.0	99.1	98.1	98.9	98.8
07/30	266.8	111.2	200.3	576.5	358.2	517.6	437.5	97.7	97.5	100.0	99.1	99.2	98.9	98.8
07/31	268.4	111.2	200.3	576.5	358.2	517.6	437.5	98.3	97.5	100.0	99.1	99.2	98.9	98.8
08/01	268.4	111.2	200.3	576.5	358.2	517.6	437.5	98.3	97.5	100.0	99.1	99.2	98.9	98.8
08/02	268.4	111.2	200.3	576.5	358.2	518.7	437.5	98.3	97.5	100.0	99.1	99.2	99.1	98.8
08/03	268.4	111.2	200.3	577.7	358.2	518.7	437.5	98.3	97.5	100.0	99.3	99.2	99.1	98.8
08/04	268.4	111.2	200.3	577.7	358.2	518.7	437.5	98.3	97.5	100.0	99.3	99.2	99.1	98.8
08/05	271.5	111.2	200.3	577.7	358.2	518.7	437.5	99.4	97.5	100.0	99.3	99.2	99.1	98.8
08/06	273.1	111.2	200.3	577.7	358.2	518.7	439.3	100.0	97.5	100.0	99.3	99.2	99.1	99.2
08/07	273.1	111.2	200.3	579.8	358.2	518.7	439.3	100.0	97.5	100.0	99.6	99.2	99.1	99.2
08/08	273.1	111.2	200.3	579.8	358.2	518.7	439.3	100.0	97.5	100.0	99.6	99.2	99.1	99.2
08/09	273.1	113.1	200.3	579.8	358.2	519.6	439.3	100.0	99.1	100.0	99.6	99.2	99.3	99.2
08/10	273.1	113.1	200.3	579.8	358.2	519.6	441.3	100.0	99.1	100.0	99.6	99.2	99.3	99.6
08/11	273.1	113.1	200.3	582.0	360.9	519.6	441.3	100.0	99.1	100.0	100.0	100.0	99.3	99.6
08/12	273.1	113.1	200.3	582.0	360.9	519.6	441.3	100.0	99.1	100.0	100.0	100.0	99.3	99.6
08/13	273.1	113.1	200.3	582.0	360.9	521.7	441.3	100.0	99.1	100.0	100.0	100.0	99.7	99.6
08/14	273.1	113.1	200.3	582.0	360.9	521.7	441.3	100.0	99.1	100.0	100.0	100.0	99.7	99.6
08/15	273.1	113.1	200.3	582.0	360.9	521.7	442.9	100.0	99.1	100.0	100.0	100.0	99.7	100.0
08/16	273.1	113.1	200.3	582.0	360.9	521.7	442.9	100.0	99.1	100.0	100.0	100.0	99.7	100.0
08/17	273.1	113.1	200.3	582.0	360.9	521.7	442.9	100.0	99.1	100.0	100.0	100.0	99.7	100.0
08/18	273.1	113.1	200.3	582.0	360.9	521.7	442.9	100.0	99.1	100.0	100.0	100.0	99.7	100.0
08/19	273.1	113.1	200.3	582.0	360.9	521.7	442.9	100.0	99.1	100.0	100.0	100.0	99.7	100.0
08/20	273.1	113.1	200.3	582.0	360.9	523.5	442.9	100.0	99.1	100.0	100.0	100.0	100.0	100.0
08/21	273.1	114.1	200.3	582.0	360.9	523.5	442.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Date	CPUE							Percent						
	1984	1985	1986	1987	1988	1989	1990	1984	1985	1986	1987	1988	1989	1990
06/04	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
06/05	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
06/06	0.0	0.0	0.0	9.1	0.0	2.9	0.0	0.0	0.0	0.0	0.3	0.0	0.4	0.0
06/07	0.0	0.0	0.0	18.2	0.0	2.9	0.0	0.0	0.0	0.0	0.7	0.0	0.4	0.0
06/08	0.0	0.0	0.0	35.2	12.3	2.9	0.0	0.0	0.0	0.0	1.3	0.8	0.4	0.0
06/09	0.0	0.0	0.0	47.8	26.6	5.8	0.0	0.0	0.0	0.0	1.7	1.8	0.7	0.0
06/10	0.0	0.0	0.0	63.5	38.3	8.7	0.0	0.0	0.0	0.0	2.3	2.6	1.1	0.0
06/11	2.7	0.0	0.0	79.6	81.6	28.5	8.2	0.5	0.0	0.0	2.9	5.4	3.6	0.0
06/12	2.7	0.0	6.0	191.4	143.2	40.0	11.1	0.5	0.0	0.2	6.9	9.5	5.0	0.0
06/13	2.7	0.0	14.1	240.0	190.7	51.1	11.1	0.5	0.0	0.6	8.7	12.7	6.4	0.0
06/14	2.7	0.0	26.9	248.7	204.5	78.0	26.6	0.5	0.0	1.1	9.0	13.6	9.8	0.7
06/15	7.7	0.0	29.8	290.4	213.6	101.8	40.7	1.3	0.0	1.2	10.5	14.2	12.7	1.0
06/16	7.7	0.0	64.5	458.2	220.9	118.0	60.3	1.3	0.0	2.5	16.6	14.7	14.8	1.0
06/17	9.8	0.0	70.3	710.2	247.2	128.7	123.0	1.7	0.0	2.8	25.7	16.5	16.1	2.4
06/18	16.3	0.0	81.8	779.2	295.6	174.6	138.7	2.8	0.0	3.2	28.2	19.7	21.8	3.6
06/19	16.3	0.0	87.6	795.7	393.6	208.7	176.6	2.8	0.0	3.4	28.8	26.2	26.1	5.4
06/20	23.1	0.0	135.3	842.8	419.4	227.5	207.4	4.0	0.0	5.3	30.5	28.0	28.4	10.9
06/21	29.8	0.0	240.3	918.8	554.1	280.1	222.4	5.1	0.0	9.4	33.3	36.9	35.0	12.3
06/22	51.9	0.0	292.6	1084.7	689.5	338.1	236.3	9.0	0.0	11.5	39.3	46.0	42.3	15.7
06/23	51.9	2.7	374.9	1439.6	806.6	374.2	313.2	9.0	0.2	14.7	52.1	53.8	46.8	19.3
06/24	66.0	16.0	494.3	1581.9	869.4	414.1	373.6	11.4	1.0	19.4	57.3	57.9	51.8	20.6
06/25	86.4	16.0	528.5	1630.5	898.2	496.7	464.2	14.9	1.0	20.7	59.1	59.9	62.1	21.9
06/26	96.9	28.3	675.9	1692.7	1012.9	522.5	488.7	16.7	1.7	26.5	61.3	67.5	65.3	28.7
06/27	108.7	39.5	853.3	1726.7	1081.6	575.6	532.2	18.8	2.4	33.4	62.5	72.1	72.0	34.1
06/28	144.3	137.0	915.8	1768.2	1123.8	615.8	622.0	24.9	8.3	35.9	64.0	74.9	77.0	42.2
06/29	182.9	137.0	949.2	1805.4	1132.9	650.3	725.7	31.6	8.3	37.2	65.4	75.5	81.3	44.3
06/30	201.4	272.3	1180.7	1969.2	1177.7	690.3	731.7	34.8	16.5	46.3	71.3	78.5	86.3	48.2
07/01	241.5	399.9	1384.8	2210.5	1268.8	703.7	755.6	41.7	24.2	54.3	80.1	84.6	88.0	56.2
07/02	258.8	526.2	1592.8	2273.3	1296.6	715.2	779.7	44.7	31.8	62.4	82.3	86.4	89.4	65.4
07/03	271.0	643.3	1745.3	2308.9	1329.0	737.6	844.8	46.8	38.9	68.4	83.6	88.6	92.2	66.0
07/04	293.6	899.4	1768.4	2433.1	1383.2	739.1	940.8	50.7	54.4	69.3	88.1	92.2	92.4	68.1
07/05	334.4	1049.1	2000.0	2599.0	1428.1	744.5	962.8	57.7	63.4	78.4	94.1	95.2	93.1	70.2
07/06	359.4	1239.0	2017.8	2611.1	1444.7	747.2	965.8	62.0	74.9	79.1	94.6	96.3	93.4	76.0
07/07	395.1	1292.7	2115.4	2655.4	1456.2	760.7	988.5	68.2	78.1	82.9	96.2	97.0	95.1	84.6
07/08	437.1	1360.7	2200.5	2661.9	1468.8	776.0	1026.8	75.5	82.3	86.2	96.4	97.9	97.0	86.5
07/09	451.0	1393.6	2232.5	2691.5	1478.4	779.0	1055.4	77.9	84.2	87.5	97.5	98.5	97.4	86.8
07/10	498.1	1438.9	2279.7	2721.8	1483.4	779.0	1069.4	86.0	87.0	89.3	98.6	98.9	97.4	88.8
07/11	525.0	1495.4	2313.2	2726.0	1487.8	781.1	1075.8	90.6	90.4	90.6	98.7	99.2	97.7	92.2
07/12	542.4	1553.0	2386.7	2729.3	1487.8	785.8	1079.8	93.6	93.9	93.5	98.9	99.2	98.2	94.8
07/13	544.8	1556.1	2407.9	2736.2	1487.8	789.9	1087.8	94.0	94.1	94.3	99.1	99.2	98.8	96.0

---- continued ----

Date	CPUE							Percent						
	1984	1985	1986	1987	1988	1989	1990	1984	1985	1986	1987	1988	1989	1990
07/14	546.5	1578.6	2428.2	2740.7	1487.8	789.9	1093.4	94.3	95.4	95.1	99.3	99.2	98.8	96.6
07/15	548.9	1584.4	2429.2	2743.7	1490.8	789.9	1101.6	94.8	95.8	95.2	99.4	99.4	98.8	96.9
07/16	548.9	1596.8	2437.4	2743.7	1492.4	797.4	1105.6	94.8	96.5	95.5	99.4	99.5	99.7	97.6
07/17	549.8	1602.6	2460.6	2745.8	1492.4	798.5	1105.6	94.9	96.9	96.4	99.4	99.5	99.8	98.1
07/18	552.7	1607.3	2480.2	2745.8	1495.7	798.5	1105.6	95.4	97.2	97.2	99.4	99.7	99.8	98.9
07/19	562.4	1609.3	2495.9	2751.9	1497.5	799.8	1107.6	97.1	97.3	97.8	99.7	99.8	100.0	99.2
07/20	564.0	1609.3	2497.9	2755.1	1497.5	799.8	1107.6	97.4	97.3	97.9	99.8	99.8	100.0	99.2
07/21	569.2	1618.6	2505.5	2755.1	1497.5	799.8	1107.6	98.3	97.8	98.2	99.8	99.8	100.0	99.2
07/22	573.2	1622.1	2512.9	2755.1	1497.5	799.8	1107.6	98.9	98.1	98.5	99.8	99.8	100.0	99.4
07/23	573.2	1625.8	2518.5	2755.1	1498.6	799.8	1107.6	98.9	98.3	98.7	99.8	99.9	100.0	99.4
07/24	575.1	1629.2	2522.4	2755.1	1498.6	799.8	1107.6	99.3	98.5	98.8	99.8	99.9	100.0	99.4
07/25	576.0	1634.6	2526.1	2755.1	1499.7	799.8	1107.6	99.4	98.8	99.0	99.8	99.9	100.0	99.4
07/26	576.0	1639.4	2534.1	2755.1	1499.7	799.8	1107.6	99.4	99.1	99.3	99.8	99.9	100.0	99.4
07/27	576.0	1647.8	2538.1	2755.1	1499.7	799.8	1107.6	99.4	99.6	99.4	99.8	99.9	100.0	99.4
07/28	577.7	1650.8	2540.0	2755.1	1499.7	799.8	1109.5	99.7	99.8	99.5	99.8	99.9	100.0	99.4
07/29	579.3	1650.8	2540.0	2755.1	1499.7	799.8	1109.5	100.0	99.8	99.5	99.8	99.9	100.0	99.4
07/30	579.3	1650.8	2540.0	2755.1	1499.7	799.8	1110.5	100.0	99.8	99.5	99.8	99.9	100.0	99.4
07/31	579.3	1652.5	2540.0	2755.1	1499.7	799.8	1112.5	100.0	99.9	99.5	99.8	99.9	100.0	99.6
08/01	579.3	1652.5	2542.2	2755.1	1500.5	799.8	1112.5	100.0	99.9	99.6	99.8	100.0	100.0	99.6
08/02	579.3	1652.5	2542.2	2757.2	1500.5	799.8	1112.5	100.0	99.9	99.6	99.9	100.0	100.0	99.7
08/03	579.3	1652.5	2544.3	2759.0	1500.5	799.8	1112.5	100.0	99.9	99.7	99.9	100.0	100.0	99.8
08/04	579.3	1652.5	2546.4	2759.0	1500.5	799.8	1112.5	100.0	99.9	99.8	99.9	100.0	100.0	99.8
08/05	579.3	1652.5	2546.4	2759.0	1500.5	799.8	1112.5	100.0	99.9	99.8	99.9	100.0	100.0	99.8
08/06	579.3	1652.5	2547.6	2759.0	1500.5	799.8	1114.3	100.0	99.9	99.8	99.9	100.0	100.0	99.8
08/07	579.3	1652.5	2547.6	2759.0	1500.5	799.8	1114.3	100.0	99.9	99.8	99.9	100.0	100.0	99.8
08/08	579.3	1654.2	2547.6	2759.0	1500.5	799.8	1114.3	100.0	100.0	99.8	99.9	100.0	100.0	99.8
08/09	579.3	1654.2	2547.6	2759.0	1500.5	799.8	1114.3	100.0	100.0	99.8	99.9	100.0	100.0	100.0
08/10	579.3	1654.2	2547.6	2759.0	1500.5	799.8	1114.3	100.0	100.0	99.8	99.9	100.0	100.0	100.0
08/11	579.3	1654.2	2548.7	2759.0	1500.5	799.8	1114.3	100.0	100.0	99.9	99.9	100.0	100.0	100.0
08/12	579.3	1654.2	2548.7	2761.0	1500.5	799.8	1114.3	100.0	100.0	99.9	100.0	100.0	100.0	100.0
08/13	579.3	1654.2	2548.7	2761.0	1500.5	799.8	1114.3	100.0	100.0	99.9	100.0	100.0	100.0	100.0
08/14	579.3	1654.2	2548.7	2761.0	1500.5	799.8	1114.3	100.0	100.0	99.9	100.0	100.0	100.0	100.0
08/15	579.3	1654.2	2551.4	2761.0	1500.5	799.8	1114.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0
08/16	579.3	1654.2	2551.4	2761.0	1500.5	799.8	1114.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0
08/17	579.3	1654.2	2551.4	2761.0	1500.5	799.8	1114.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0
08/18	579.3	1654.2	2551.4	2761.0	1500.5	799.8	1114.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0
08/19	579.3	1654.2	2551.4	2761.0	1500.5	799.8	1114.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0
08/20	579.3	1654.2	2551.4	2761.0	1500.5	799.8	1114.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0
08/21	579.3	1654.2	2552.3	2761.0	1500.5	799.8	1114.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Date	CPUE							Percent						
	1984	1985	1986	1987	1988	1989	1990	1984	1985	1986	1987	1988	1989	1990
07/12	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
07/13	1.2	0.0	0.0	0.0	1.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
07/14	1.2	0.0	0.0	0.0	1.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
07/15	1.2	0.0	1.9	0.0	1.0	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
07/16	2.7	0.9	3.9	0.0	1.0	5.7	0.0	0.1	0.1	0.1	0.0	0.0	0.2	0.0
07/17	4.1	2.5	5.7	0.0	3.9	7.9	0.0	0.1	0.2	0.1	0.0	0.1	0.3	0.0
07/18	7.5	2.5	9.5	0.0	3.9	10.8	0.0	0.2	0.2	0.2	0.0	0.1	0.4	0.0
07/19	13.2	4.2	18.3	0.0	3.9	10.8	3.7	0.4	0.3	0.4	0.0	0.1	0.4	0.1
07/20	22.2	7.9	28.4	0.0	5.7	23.3	17.0	0.7	0.5	0.7	0.0	0.2	1.0	0.7
07/21	26.4	13.3	40.3	0.0	7.9	33.7	26.8	0.9	0.8	0.9	0.0	0.3	1.4	1.0
07/22	29.9	28.1	48.2	6.8	11.1	48.2	34.0	1.0	1.8	1.1	0.3	0.4	2.0	1.3
07/23	36.7	28.1	64.6	8.0	11.1	54.9	37.2	1.2	1.8	1.5	0.4	0.4	2.2	1.5
07/24	45.3	31.1	115.7	8.0	24.2	60.7	45.3	1.5	2.0	2.7	0.4	0.8	2.5	1.8
07/25	56.6	48.5	145.0	9.3	37.4	64.7	47.4	1.9	3.1	3.4	0.5	1.2	2.6	1.8
07/26	72.6	68.9	163.2	12.4	43.7	65.7	49.2	2.4	4.4	3.8	0.6	1.4	2.7	1.9
07/27	95.4	72.8	215.4	16.7	81.0	69.7	63.3	3.1	4.6	5.0	0.8	2.6	2.8	2.5
07/28	127.7	89.1	235.0	19.1	152.9	77.6	126.0	4.2	5.7	5.4	1.0	4.8	3.2	4.9
07/29	186.3	128.4	299.2	30.8	182.4	86.4	143.9	6.1	8.2	6.9	1.5	5.8	3.5	5.6
07/30	341.3	147.7	351.2	36.5	226.2	122.5	147.8	11.2	9.4	8.1	1.8	7.2	5.0	5.7
07/31	491.4	167.2	374.2	38.9	279.6	456.0	157.8	16.1	10.6	8.7	1.9	8.8	18.6	6.1
08/01	685.9	205.1	652.4	52.5	328.9	666.5	183.4	22.4	13.0	15.1	2.6	10.4	27.2	7.5
08/02	768.7	233.4	746.5	91.2	357.2	1059.0	205.3	25.1	14.8	17.3	4.5	11.3	43.2	8.7
08/03	1049.9	290.4	1111.8	171.1	444.6	1144.5	225.8	34.3	18.4	25.7	8.5	14.1	46.7	9.5
08/04	1094.9	348.3	1498.0	227.9	483.8	1163.3	279.6	35.8	22.1	34.7	11.4	15.3	47.5	11.6
08/05	1183.6	377.8	1721.2	253.0	518.1	1303.5	344.7	38.7	24.0	39.9	12.6	16.4	53.2	15.4
08/06	1318.0	463.0	1933.2	297.2	858.9	1602.2	423.1	43.1	29.4	44.8	14.8	27.2	65.4	18.5
08/07	1350.8	605.2	2143.0	392.4	1195.5	1793.0	473.2	44.2	38.4	49.6	19.6	37.8	73.1	20.5
08/08	1456.2	690.8	2230.2	435.1	1343.4	1829.4	549.2	47.6	43.9	51.6	21.7	42.5	74.6	23.4
08/09	1534.1	799.0	2372.5	470.3	1385.1	1978.0	666.8	50.2	50.7	54.9	23.5	43.8	80.7	28.0
08/10	1588.5	895.9	2651.2	505.6	1500.3	2004.2	725.2	52.0	56.9	61.4	25.2	47.5	81.8	30.3
08/11	1699.4	1096.8	2733.7	537.7	1738.9	2135.9	789.4	55.6	69.6	63.3	26.8	55.0	87.1	32.8
08/12	1782.5	1189.6	3024.0	710.7	1941.1	2210.0	999.0	58.3	75.5	70.0	35.5	61.4	90.2	41.0
08/13	1819.0	1256.1	3120.7	822.9	2006.6	2238.2	1178.6	59.5	79.7	72.3	41.0	63.5	91.3	48.2
08/14	1842.8	1286.5	3186.3	1145.0	2176.4	2258.6	1344.9	60.3	81.7	73.8	57.1	68.9	92.1	54.8
08/15	1841.8	1347.6	3351.6	1291.2	2349.8	2262.0	1603.1	60.2	85.5	77.6	64.4	74.4	92.3	64.9
08/16	1957.2	1416.0	3402.4	1405.4	2404.1	2263.4	1710.7	64.0	89.9	78.8	70.1	76.1	92.3	69.1
08/17	2169.2	1433.8	3442.8	1487.9	2521.1	2275.4	1801.3	71.0	91.0	79.7	74.2	79.8	92.8	72.6
08/18	2463.5	1456.9	3551.1	1540.3	2631.7	2280.5	1887.2	80.6	92.5	82.2	76.8	83.3	93.0	76.0
08/19	2645.5	1460.9	3636.6	1556.2	2666.3	2286.6	1948.4	86.5	92.7	84.2	77.6	84.4	93.3	78.4
08/20	2649.8	1473.8	3669.7	1566.6	2702.5	2300.0	2031.6	86.7	93.6	85.0	78.1	85.5	93.8	81.6

--- continued ---

Date	CPUE							Percent						
	1984	1985	1986	1987	1988	1989	1990	1984	1985	1986	1987	1988	1989	1990
08/21	2676.8	1490.9	3761.8	1582.2	2711.3	2342.6	2070.4	87.6	94.6	87.1	78.9	85.8	95.6	83.1
08/22	2794.5	1490.9	3813.2	1590.4	2779.0	2359.2	2139.0	91.4	94.6	88.3	79.3	88.0	96.2	85.8
08/23	2816.8	1499.5	3940.8	1611.3	2849.1	2375.1	2269.9	92.1	95.2	91.2	80.4	90.2	96.9	90.9
08/24	2826.1	1507.5	4020.2	1636.0	2943.2	2379.6	2309.8	92.4	95.7	93.1	81.6	93.1	97.1	92.5
08/25	2860.2	1519.2	4214.2	1647.5	3048.4	2399.4	2370.7	93.6	96.4	97.6	82.2	96.5	97.9	94.8
08/26	2876.8	1519.2	4303.7	1662.7	3097.2	2412.1	2426.8	94.1	96.4	99.6	82.9	98.0	98.4	97.6
08/27	2892.3	1529.2	4319.0	1693.3	3144.7	2427.3	2465.5	94.6	97.1	100.0	84.5	99.5	99.0	99.1
08/28	2908.4	1567.3	4319.0	1736.9	3153.6	2439.2	2467.3	95.1	99.5	100.0	86.6	99.8	99.5	99.2
08/29	2952.7	1575.3		1762.7	3159.7	2444.1	2479.9	96.6	100.0		87.9	100.0	99.7	99.7
08/30	2971.7	1575.3		1807.4		2445.1	2487.7	97.2	100.0		90.2		99.7	100.0
08/31	2997.2	1575.3		1807.4		2451.3	2487.7	98.0	100.0		90.2		100.0	100.0
09/01	3005.2	1575.3		1827.5				98.3	100.0		91.2			
09/02	3015.7	1575.3		1858.6				98.6	100.0		92.7			
09/03	3019.2	1575.3		1898.8				98.8	100.0		94.7			
09/04	3022.8	1575.3		1911.6				98.9	100.0		95.4			
09/05	3049.9	1575.3		1943.4				99.8	100.0		96.9			
09/06	3057.2	1575.3		1956.5				100.0	100.0		97.6			
09/07				1974.0							98.5			
09/08				1982.1							98.9			
09/09				2001.1							99.8			
09/10				2004.7							100.0			
09/11				2004.7							100.0			

Date	CPUE							Percent						
	1984	1985	1986	1987	1988	1989	1990	1984	1985	1986	1987	1988	1989	1990
06/01						2.6	0.0						0.1	0.0
06/02						2.6	0.0						0.1	0.0
06/03						2.6	0.0						0.1	0.0
06/04	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
06/05	0.0	0.0	0.0	3.3	8.7	5.6	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.0
06/06	0.0	0.0	0.0	15.7	8.7	5.6	2.7	0.0	0.0	0.0	0.3	0.2	0.2	0.1
06/07	0.0	0.0	0.0	21.8	11.7	11.5	2.7	0.0	0.0	0.0	0.4	0.2	0.4	0.1
06/08	4.7	0.0	0.0	30.3	23.0	27.8	2.7	0.2	0.0	0.0	0.6	0.4	1.1	0.1
06/09	4.7	0.0	0.0	45.3	60.9	30.3	2.7	0.2	0.0	0.0	0.9	1.2	1.2	0.1
06/10	4.7	0.0	6.0	51.5	90.3	42.1	2.7	0.2	0.0	0.1	1.1	1.7	1.6	0.1
06/11	4.7	0.0	15.0	72.4	152.8	44.8	2.7	0.2	0.0	0.4	1.5	2.9	1.7	0.1
06/12	7.0	0.0	15.0	85.7	243.8	62.0	5.7	0.3	0.0	0.4	1.7	4.7	2.4	0.2
06/13	17.0	0.0	23.3	104.8	331.1	82.5	5.7	0.7	0.0	0.6	2.1	6.4	3.2	0.2
06/14	27.4	0.0	51.8	107.6	350.3	89.7	18.3	1.2	0.0	1.2	2.2	6.8	3.4	0.7
06/15	29.9	0.0	57.6	117.4	395.4	125.6	18.3	1.3	0.0	1.4	2.4	7.6	4.8	0.7
06/16	44.8	0.0	69.4	159.4	421.0	149.8	21.1	1.9	0.0	1.7	3.3	8.1	5.7	0.8
06/17	52.6	0.0	78.7	281.0	476.6	154.2	43.5	2.2	0.0	1.9	5.7	9.2	5.9	1.6
06/18	63.3	2.7	78.7	321.8	671.3	202.9	63.0	2.7	0.2	1.9	6.6	12.9	7.8	2.3
06/19	68.3	2.7	87.5	327.7	831.7	270.8	90.8	2.9	0.2	2.1	6.7	16.0	10.4	3.3
06/20	99.6	5.4	125.5	387.7	881.4	314.7	99.5	4.2	0.4	3.0	7.9	17.0	12.1	3.7
06/21	140.7	8.3	171.4	412.1	1024.9	390.5	129.5	5.9	0.6	4.1	8.4	19.8	15.0	4.8
06/22	215.9	16.5	295.1	612.6	1276.0	446.4	151.9	9.1	1.2	7.0	12.5	24.6	17.1	5.6
06/23	224.9	24.6	402.6	715.1	1522.3	525.0	205.1	9.4	1.9	9.6	14.6	29.3	20.1	7.5
06/24	245.3	89.8	553.9	763.1	1608.0	691.8	282.1	10.3	6.8	13.2	15.6	31.0	26.5	10.4
06/25	302.1	204.6	623.5	828.9	1623.9	900.2	314.0	12.7	15.4	14.9	16.9	31.3	34.5	11.6
06/26	307.3	207.2	710.6	928.4	1687.1	1011.4	362.9	12.9	15.6	16.9	19.0	32.5	38.8	13.4
06/27	424.5	231.8	841.9	1015.3	1992.7	1145.2	531.2	17.8	17.5	20.1	20.7	38.4	43.9	19.5
06/28	608.2	259.8	1046.1	1120.3	2101.2	1222.9	603.1	25.5	19.6	24.9	22.9	40.5	46.9	22.2
06/29	831.6	262.8	1164.3	1388.5	2209.5	1345.4	690.2	34.9	19.8	27.7	28.4	42.6	51.6	25.4
06/30	865.3	315.2	1637.0	1634.5	2298.0	1451.7	721.9	36.3	23.7	39.0	33.4	44.3	55.6	26.6
07/01	1001.1	380.1	1817.3	1786.6	2680.4	1566.9	789.4	42.0	28.6	43.3	36.5	51.7	60.0	29.0
07/02	1067.6	438.4	1934.9	1906.3	2868.4	1633.3	816.9	44.8	33.0	46.1	38.9	55.3	62.6	30.1
07/03	1071.0	462.9	1970.6	1940.5	3305.8	1711.2	1017.2	45.0	34.9	47.0	39.6	63.7	65.6	37.4
07/04	1172.1	642.8	1976.5	2002.6	3774.7	1768.3	1230.9	49.2	48.4	47.1	40.9	72.7	67.8	45.3
07/05	1321.6	819.6	2094.9	2179.7	3966.4	1949.9	1419.0	55.5	61.7	49.9	44.5	76.4	74.7	52.2
07/06	1449.2	896.4	2101.3	2568.8	4086.2	2008.9	1444.9	60.8	67.5	50.1	52.5	78.7	77.0	53.2
07/07	1537.2	927.5	2179.8	3031.5	4113.7	2125.5	1618.2	64.5	69.9	51.9	61.9	79.3	81.5	59.5
07/08	1807.2	951.7	2378.7	3089.9	4147.9	2190.5	1753.9	75.9	71.7	56.7	62.7	79.9	83.9	64.5
07/09	1844.7	957.1	2502.1	3341.5	4240.2	2247.4	1814.9	77.5	72.1	59.6	68.2	81.7	86.1	66.8
07/10	1947.9	996.9	2810.3	3549.8	4387.7	2313.8	1896.3	81.8	75.1	67.0	72.5	84.6	88.7	69.8

---- continued ----

Date	CPIUE							Percent						
	1984	1985	1986	1987	1988	1989	1990	1984	1985	1986	1987	1988	1989	1990
07/11	1995.7	1022.0	2950.8	3612.4	4471.1	2317.1	1974.7	83.8	77.0	70.3	73.8	86.2	88.8	72.6
07/12	2047.8	1114.9	3018.5	3665.0	4536.1	2323.9	2048.2	86.0	84.0	71.9	74.8	87.4	89.1	75.4
07/13	2086.6	1117.9	3092.2	3751.8	4599.3	2378.3	2071.0	87.6	84.2	73.7	76.6	88.6	91.1	76.2
07/14	2093.2	1123.3	3338.4	4006.8	4636.9	2413.2	2104.1	87.9	84.6	79.6	81.8	89.4	92.5	77.4
07/15	2109.1	1123.3	3372.8	4068.3	4705.8	2423.9	2128.0	88.6	84.6	80.4	83.1	90.7	92.9	78.3
07/16	2124.8	1123.3	3460.2	4101.2	4787.7	2444.3	2165.4	89.2	84.6	82.5	83.7	92.3	93.7	79.7
07/17	2132.2	1126.3	3623.1	4208.0	4851.9	2461.4	2189.7	89.5	84.9	86.3	85.9	93.5	94.3	80.6
07/18	2223.4	1136.6	3756.7	4333.0	4909.2	2484.8	2248.5	93.4	85.6	89.5	88.5	94.6	95.2	82.7
07/19	2247.5	1136.6	3782.2	4535.4	4925.0	2501.1	2315.0	94.4	85.6	90.1	92.6	94.9	95.8	85.2
07/20	2262.2	1136.6	3792.2	4705.6	4954.2	2529.8	2387.9	95.0	85.6	90.4	96.1	95.5	96.9	87.8
07/21	2276.2	1142.2	3808.3	4728.7	4989.8	2542.7	2444.9	95.6	86.1	90.8	96.6	96.2	97.4	89.9
07/22	2291.9	1173.8	3855.0	4740.3	4999.4	2550.1	2484.9	96.2	88.4	91.9	96.8	96.3	97.7	91.4
07/23	2300.5	1183.0	3897.8	4748.3	5005.4	2563.5	2519.5	96.6	89.1	92.9	97.0	96.5	98.2	92.7
07/24	2318.3	1201.6	3947.4	4776.4	5029.6	2563.5	2543.6	97.3	90.5	94.1	97.5	96.9	98.2	93.6
07/25	2322.7	1208.9	3983.4	4817.0	5045.1	2567.8	2551.6	97.5	91.1	94.9	98.4	97.2	98.4	93.9
07/26	2330.4	1213.5	4035.1	4837.0	5057.7	2567.8	2553.7	97.8	91.4	96.2	98.8	97.5	98.4	93.9
07/27	2336.6	1225.4	4068.6	4841.3	5075.2	2567.8	2572.0	98.1	92.3	97.0	98.9	97.8	98.4	94.6
07/28	2340.9	1231.3	4094.6	4847.3	5084.9	2567.8	2606.6	98.3	92.8	97.6	99.0	98.0	98.4	95.9
07/29	2348.0	1233.3	4123.8	4852.0	5097.5	2569.1	2642.6	98.6	92.9	98.3	99.1	98.2	98.5	97.2
07/30	2351.4	1242.7	4142.3	4854.3	5120.4	2569.1	2651.4	98.7	93.6	98.7	99.1	98.7	98.5	97.5
07/31	2359.0	1248.9	4144.3	4855.6	5126.0	2583.2	2653.4	99.0	94.1	98.8	99.1	98.8	99.0	97.6
08/01	2364.9	1250.9	4148.0	4859.9	5131.4	2589.6	2659.1	99.3	94.2	98.8	99.2	98.9	99.2	97.8
08/02	2365.6	1255.3	4155.1	4863.2	5135.3	2597.4	2665.0	99.3	94.6	99.0	99.3	99.0	99.5	98.0
08/03	2367.2	1265.1	4167.5	4872.3	5141.8	2601.2	2670.6	99.4	95.3	99.3	99.5	99.1	99.7	98.2
08/04	2370.0	1268.9	4172.2	4883.5	5144.8	2602.2	2672.5	99.5	95.6	99.4	99.7	99.2	99.7	98.3
08/05	2372.6	1269.9	4172.2	4886.7	5147.6	2602.2	2673.4	99.6	95.7	99.4	99.8	99.2	99.7	98.4
08/06	2378.4	1269.9	4176.8	4890.9	5155.1	2605.2	2696.7	99.9	95.7	99.5	99.9	99.3	99.8	99.2
08/07	2380.1	1270.7	4176.8	4890.9	5174.1	2607.2	2702.7	99.9	95.7	99.5	99.9	99.7	99.9	99.4
08/08	2380.1	1272.4	4181.1	4890.9	5176.9	2607.2	2702.7	99.9	95.9	99.6	99.9	99.8	99.9	99.4
08/09	2380.1	1280.6	4181.1	4893.1	5179.7	2609.5	2706.6	99.9	96.5	99.6	99.9	99.8	100.0	99.6
08/10	2380.1	1280.6	4181.1	4895.4	5184.0	2609.5	2708.4	99.9	96.5	99.6	100.0	99.9	100.0	99.6
08/11	2380.1	1284.6	4183.7	4897.6	5187.2	2609.5	2710.4	99.9	96.8	99.7	100.0	100.0	100.0	99.7
08/12	2380.1	1290.3	4184.7	4897.6	5188.9	2609.5	2714.3	99.9	97.2	99.7	100.0	100.0	100.0	99.9
08/13	2380.1	1290.3	4184.7	4897.6	5188.9	2609.5	2714.3	99.9	97.2	99.7	100.0	100.0	100.0	99.9
08/14	2380.1	1290.3	4187.1	4897.6	5188.9	2609.5	2714.3	99.9	97.2	99.8	100.0	100.0	100.0	99.9
08/15	2380.1	1326.3	4187.1	4897.6	5188.9	2609.5	2716.4	99.9	99.9	99.8	100.0	100.0	100.0	99.9
08/16	2380.1	1327.3	4187.1	4897.6	5188.9	2609.5	2718.2	99.9	100.0	99.8	100.0	100.0	100.0	100.0
08/17	2380.1	1327.3	4187.1	4897.6	5188.9	2609.5	2718.2	99.9	100.0	99.8	100.0	100.0	100.0	100.0
08/18	2380.1	1327.3	4187.1	4897.6	5188.9	2609.5	2718.2	99.9	100.0	99.8	100.0	100.0	100.0	100.0
08/19	2380.1	1327.3	4189.0	4897.6	5188.9	2609.5	2718.2	99.9	100.0	99.8	100.0	100.0	100.0	100.0
08/20	2381.7	1327.3	4196.4	4897.6	5188.9	2609.5	2718.2	100.0	100.0	100.0	100.0	100.0	100.0	100.0
08/21	2381.7	1327.3	4196.4	4897.6	5188.9	2609.5	2718.2	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Appendix B.11 Commercial coho salmon catches by period, lower Kuskokwim
River (District 1), 1974-1990.

<u>Year</u>	<u>Date</u>	<u>Catch</u>	<u>Fishermen</u>	<u>Fishermen</u>	<u>Catch/Hr.</u>
				<u>Hours</u>	
1974	Aug 01-02	9,576	267	3,444	2.8
	Aug 05-08	59,090	444	31,968	1.8
	Aug 12-15	58,066	396	28,512	2.0
	Aug 19-22	12,301	263	18,936	0.6
	Aug 26-29	5,360	107	7,704	0.7
	Sept 2-05	430	25	1,815	0.2
	Totals	144,823	516	92,379	1.6
1975	Aug 10	2,357	142	852	2.8
	Aug 04-06	12,500	292	14,016	0.9
	Aug 11-13	18,551	373	17,904	1.0
	Aug 18-20	34,435	388	18,624	1.9
	Aug 25-27	16,277	270	12,960	1.3
	Totals	84,120	533	64,356	1.3
1976	Aug 02-03	10,534	286	6,864	1.5
	Aug 09-11	29,728	400	19,200	1.5
	Aug 16-18	28,664	387	18,576	1.5
	Aug 23-25	14,543	300	14,400	1.0
	Aug 30-31	4,420	174	7,308	0.6
	Totals	87,889	516	66,348	1.3
1977	Aug 01-02	23,987	360	8,640	2.8
	Aug 03-10	91,474	487	23,376	3.9
	Aug 15-16	60,935	438	10,512	5.8
	Aug 18	25,589	378	4,536	5.6
	Aug 22	16,980	361	4,332	3.9
	Aug 25	11,874	264	3,168	3.7
	Aug 29	6,819	204	2,448	2.8
	Totals	237,658	572	57,012	4.2
1978	Aug 01	6,311	297	3,564	1.8
	Aug 04	9,455	364	4,368	2.2
	Aug 08	20,501	433	5,196	3.9
	Aug 11	42,428	485	5,820	7.3
	Aug 15	48,950	476	5,712	8.6
	Aug 18	29,485	434	5,208	5.7
	Aug 22	22,287	396	4,752	4.7
	Aug 25	11,168	293	3,516	3.2
	Aug 29	12,215	250	3,000	4.1
	Totals	202,800	597	41,136	4.9

-continued-

Appendix B.11 (page 2 of 5)

<u>Year</u>	<u>Date</u>	<u>Catch</u>	<u>Fishermen</u>	<u>Fishermen</u>	
				<u>Hours</u>	<u>Catch/Hr.</u>
1979	Aug 02	52,276	478	5,736	9.1
	Aug 06	53,797	480	2,880	18.7
	Aug 09	26,422	497	2,982	8.9
	Aug 13	27,915	463	2,778	10.0
	Aug 16	21,675	467	2,802	7.7
	Aug 20	19,445	390	2,340	8.3
	Aug 23	5,376	328	1,968	2.7
	Aug 27	6,342	310	3,720	1.7
	Aug 30	2,182	179	2,148	1.0
	Totals	215,430	613	27,354	7.9
1980	Aug 02	9,889	375	2,250	4.4
	Aug 07	36,126	455	2,730	13.2
	Aug 11	35,178	482	2,892	12.2
	Aug 14	28,211	439	2,634	10.7
	Aug 18	43,748	441	2,646	16.5
	Aug 21	33,274	419	2,514	13.2
	Aug 25	19,264	370	2,220	8.7
	Aug 28	13,484	319	1,914	7.0
	Totals	219,174	586	19,800	11.1
1981	Aug 03	16,184	430	2,580	6.3
	Aug 06	13,885	441	2,646	5.2
	Aug 10	26,972	445	2,670	10.1
	Aug 13	46,252	473	2,838	16.3
	Aug 17	34,739	458	2,748	12.6
	Aug 20	24,184	380	2,280	10.6
	Aug 24	23,771	372	2,232	10.7
	Aug 27	13,785	346	2,076	6.6
	Aug 31	8,096	278	1,668	4.9
	Totals	207,868	586	21,738	9.6
1982	July 29	19,561	416	2,496	7.8
	Aug 02	31,944	388	2,328	13.7
	Aug 05	35,766	455	2,670	13.4
	Aug 09	61,231	442	2,652	23.1
	Aug 12	80,685	449	2,694	29.9
	Aug 16	77,785	420	2,520	30.9
	Aug 19	49,566	403	2,418	20.5
	Aug 23	25,218	349	2,094	12.0
	Aug 26	26,761	314	1,884	14.2
	Aug 30	26,815	302	1,812	14.8
	Totals	435,332	596	23,568	18.5

-continued-

Year	Date	Catch	Fishermen	Fishermen	Catch/Hr.
				Hours	
1983	Aug 01	9,767	377	2,262	4.3
	Aug 04	15,389	430	2,580	6.0
	Aug 08	34,541	383	2,298	15.0
	Aug 11	35,268	485	2,910	12.1
	Aug 15	24,072	462	2,772	8.7
	Aug 18	22,822	408	2,448	9.3
	Aug 22	34,918	388	2,328	15.0
	Aug 26	19,039	323	1,938	9.8
	Totals	195,816	577	19,536	10.0
1984	July 30	56,609	459	2,754	20.6
	Aug 02	79,240	401	2,406	32.9
	Aug 06	84,406	542	4,878	17.3
	Aug 09	80,990	523	4,707	17.2
	Aug 13	80,268	504	4,536	17.7
	Aug 16	78,342	502	4,518	17.3
	Aug 20	63,829	491	4,419	14.4
	Aug 23	49,372	481	4,329	11.4
	Aug 27	16,472	350	3,150	5.2
	Aug 30	11,222	210	1,890	5.9
	Sept 03	1,603	69	360	4.5
	Sept 06	1,877	39	234	8.0
	Totals	604,230	619	38,181	15.8
1985	Aug 01	34,052	487	2,922	11.7
	Aug 05	54,819	527	3,162	17.3
	Aug 08	78,149	525	3,150	24.8
	Aug 12	77,809	530	3,180	24.5
	Aug 15	28,013	441	2,646	10.6
	Aug 19	19,316	406	2,436	7.9
	Aug 22	17,534	390	2,340	7.5
	Aug 26	10,688	297	1,782	6.0
	Aug 29	9,568	262	1,572	6.1
	Totals	329,948	627	23,190	14.2
1986	July 31	27,553	352	2,112	13.0
	Aug 04	96,127	530	3,180	30.2
	Aug 07	127,024	600	5,400	23.5
	Aug 11	82,215	553	3,318	24.8
	Aug 13	92,918	526	3,156	29.4
	Aug 15	55,633	519	3,114	17.9
	Aug 18	51,328	477	2,862	17.9
	Aug 21	50,640	465	2,790	18.2
	Aug 25	37,365	458	2,748	13.6
	Aug 28	16,436	346	2,076	7.9
	Sept 01	5,949	234	1,404	4.2
	Totals	643,188	663	32,160	20.0

-continued-

Appendix B.11 (page 4 of 5)

<u>Year</u>	<u>Date</u>	<u>Catch</u>	<u>Fishermen</u>	<u>Fishermen</u>	
				<u>Hours</u>	<u>Catch/Hr.</u>
1987	Aug 06	46,182	590	3,540	13.0
	Aug 13	104,968	604	3,624	29.0
	Aug 17	73,867	595	3,570	20.7
	Aug 19	45,277	585	3,510	12.9
	Aug 21	33,601	540	3,240	10.4
	Aug 24	27,607	500	3,000	9.2
	Aug 27	21,772	479	2,874	7.6
	Aug 31	12,873	364	2,184	5.9
	Sept 03	11,352	278	1,668	6.8
	Sept 07	4,311	132	792	5.4
	Totals	381,810	694	28,002	13.6
1988	June 16	0	602	4,816	0
	June 20	0	612	3,672	0
	June 24	0	644	3,864	0
	June 28	0	609	3,654	0
	July 02	0	580	3,480	0
	July 05	9	579	3,474	0
	July 08	1	604	3,624	0
	July 11	24	598	3,588	0.0
	July 14	141	597	3,582	0.04
	July 18	502	575	3,450	0.14
	July 21	1,278	539	3,234	0.39
	July 25	6,323	494	2,964	2.13
	July 28	20,970	552	3,312	6.33
	Aug 01	33,954	594	3,564	9.53
	Aug 04	76,576	639	3,834	19.97
	Aug 08	76,345	640	3,840	19.88
	Aug 10	53,874	596	3,576	15.06
	Aug 12	84,700	624	3,744	22.62
	Aug 15	59,724	613	3,678	16.23
	Aug 18	37,415	620	3,720	10.06
	Aug 20	24,046	577	3,462	6.95
	Aug 27	22,683	532	3,192	7.10
	Aug 31	12,264	412	2,472	4.96
	Total	510,829	746	81,796	6.24

-continued-

<u>Year</u>	<u>Date</u>	<u>Catch</u>	<u>Fishermen</u>	<u>Fishermen Hours</u>	<u>Catch/Hr.</u>
1989	June 19	0	374	2,988	0
	June 23	0	277	2,218	0
	June 26	0	126	1,006	0
	June 30	0	642	5,129	0
	July 03	0	629	3,770	0
	July 05	3	553	3,311	0
	July 08	9	621	3,733	0
	July 11	126	616	3,676	0.03
	July 14	230	590	3,576	0.06
	July 18	2,216	437	2,630	0.85
	July 27	5,651	562	3,364	1.68
	Aug 03	99,022	679	5,432	18.23
	Aug 07	73,514	642	3,853	19.08
	Aug 09	103,158	644	3,864	26.70
	Aug 12	81,970	650	3,900	21.02
	Aug 15	23,071	616	3,697	6.24
	Aug 18	5,938	381	2,284	2.60
	Aug 23	30,940	528	3,167	9.77
	Aug 26	20,881	508	4,063	5.14
	Aug 29	11,080	423	3,388	3.27
	Sept 01	3,225	194	1,421	2.77
Total		461,034	745	70,470	6.54
1990	July 14	70	625	5,000	0.01
	Aug 01	23,549	611	3,666	6.42
	Aug 06	61,450	631	3,786	16.23
	Aug 10	58,251	653	3,918	14.87
	Aug 13	115,444	642	3,852	29.97
	Aug 16	68,605	650	5,850	11.73
	Aug 20	51,838	594	3,564	14.54
	Aug 27	16,030	534	3,204	5.00
Total		395,237	743	51,236	12.03

Brood Year	Escapement Index ^a	Return Index by Age ^b					Total	Return/ Spawner Index
		3	4	5	6	7		
1976	22,771	0	11,946	40,364	72,973	5,928	131,211	5.8
1977	12,670	0	2,917	26,883	54,606	10,062	94,468	7.5
1978	42,799	0	13,398	20,508	38,952	4,169	77,027	1.8
1979	32,212	333	21,526	23,614	27,585	4,777	77,835	2.4
1980	24,290	1,865	10,097	29,435	30,856	3,055	75,025	3.1
1981	48,546	285	23,282	33,847	62,900	7,298	129,591	2.6
1982	27,690	0	3,285	16,404	18,840	8,796	47,325	1.7
1983	8,878	416	21,146	52,445	39,829			
1984	13,829	0	31,060	30,089				
1985	13,669	0	37,186					
1986	11,742	0						
1987	18,945							
1988	27,827							
1989	32,599							
1990								

^a Aerial survey index plus Kogrukuk Weir estimate.

^b Total commercial and subsistence catch by age, based primarily on commercial catch sample in District 1. Age 8 fish were excluded due to their rare occurrence. The year of return is obtained by adding the age to the brood year.

Appendix B.13 Comparative chinook salmon catches by fishing period by year
in District 2, Middle Kuskokwim River, 1985 - 1990.

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1985	June 20	136	8	48	2.83
	June 24	263	11	66	3.98
	June 27	548	12	72	7.61
	July 01	779	15	90	8.66
	July 04	0	0	0	0
	Aug. 08	0	6	48	0
	Aug. 12	3	14	84	0.04
	Aug. 15	1	11	66	0.00
Total		1,730	23	474	3.65
1986	June 26	186	3	18	10.33
	June 30	386	13	78	4.95
	July 03	168	8	48	3.50
	July 07	117	2	12	9.75
	July 10	45	6	36	1.25
	Aug. 07	0	8	48	0.00
	Aug. 11	0	10	60	0.00
	Aug. 13	0	10	60	0.00
	Aug. 15	1	27	162	0.01
	Aug. 18	1	8	48	0.02
	Aug. 21	0	6	36	0.00
Total		904	43	606	1.49
1987	July 03	1,325	15	90	14.72
	July 07	935	22	132	7.08
	Aug. 13	4	14	84	0.05
	Aug. 17	6	14	84	0.07
	Aug. 19	1	13	78	0.01
	Aug. 21	1	18	108	0.01
Total		2,272	29	576	3.94
1988	June 24	669	13	78	8.58
	June 28	746	17	102	7.31
	July 02	468	19	114	4.11
	Aug 08	6	14	84	0.07
	Aug 10	10	16	96	0.10
	Aug 12	3	20	120	0.03
	Aug 15	1	21	126	0.01
	Aug 18	2	15	90	0.02
	Aug 20	1	17	102	0.01
Total		1,906	29	912	2.25

-Continued-

Appendix B.13 (page 2 of 2)

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1989	June 30	610	15	120	1.80
	July 03	371	18	108	1.22
	July 05	264	14	84	1.00
	July 11	3	14	84	0.46
	Aug 07	3	22	132	0.02
	Aug 09	1	18	108	0.01
	Aug 15	3	15	90	0.01
	Aug 18	7	20	120	0.00
Total		41,745	30	846	1.66
1990	June 29	641	14	84	7.63
	July 05	467	15	90	5.19
	July 09	255	17	102	2.50
	July 14	209	17	136	1.54
	Aug 06	21	15	90	0.23
	Aug 10	17	15	90	0.19
	Aug 13	4	15	90	0.04
	Aug 16	6	17	153	0.04
	Aug 20		18	108	
	Aug 27	1	17	102	0.01
Total		1,621	22	1,045	1.13

Appendix B.14

Comparative sockeye salmon catches by fishing period
by year in District 2, Middle Kuskokwim River,
1985 - 1990.

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1985	June 20	115	8	48	2.40
	June 24	340	11	66	5.15
	June 27	739	12	72	10.26
	July 01	1,100	15	90	12.22
	July 04	0	0	0	0
	Aug. 08	0	6	48	0.00
	Aug. 12	0	14	84	0.00
	Aug. 15	0	11	66	0.00
Total		2,294	23	474	4.84
1986	June 26	616	3	18	34.22
	June 30	1,171	13	78	15.01
	July 03	265	8	48	5.52
	July 07	26	2	12	2.17
	July 10	179	6	36	4.97
	Aug. 07	0	8	48	0.00
	Aug. 11	0	10	60	0.00
	Aug. 13	1	10	60	0.02
	Aug. 15	0	27	162	0.00
	Aug. 18	0	8	48	0.00
	Aug. 21	0	6	36	0.00
Total		904	43	606	1.49
1987	July 03	511	15	90	5.68
	July 07	1,459	22	132	11.05
	Aug. 13	1	14	84	0.01
	Aug. 17	0	14	84	0.00
	Aug. 19	0	13	78	0.00
	Aug. 21	0	18	108	0.00
Total		1,971	29	576	3.42
1988	June 24	1,041	13	78	13.35
	June 28	639	17	102	6.26
	July 02	579	19	114	5.08
	Aug 08	0	14	84	0.00
	Aug 10	0	16	96	0.00
	Aug 12	2	20	120	0.02
	Aug 15	0	21	126	0.00
	Aug 18	0	15	90	0.00
	Aug 20	0	17	102	0.00
Total		1,906	29	912	2.75

-Continued-

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1989	June 30	587	15	120	4.89
	July 03	238	18	108	2.20
	July 05	176	14	84	2.10
	July 11	95	14	84	1.13
	Aug 07	0	22	132	0.00
	Aug 09	0	18	108	0.00
	Aug 15	0	15	90	0.00
	Aug 18	0	20	120	0.00
Total		1,096	30	846	1.29
1990	June 29	735	14	84	8.75
	July 05	561	15	90	6.23
	July 09	580	17	102	5.69
	July 14	567	17	136	4.17
	Aug 06	5	15	90	0.06
	Aug 10	5	15	90	0.06
	Aug 13	1	16	96	0.01
	Aug 16	0	17	153	0.00
	Aug 20	0	18	108	0.00
	Aug 27	1	17	102	0.03
Total		2,457	22	1,045	1.72

Appendix B.15

Comparative chum salmon catches by fishing period by
year in District 2, Middle Kuskokwim River,
1985 - 1990.

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1985	June 20	647	8	48	13.48
	June 24	2,411	11	66	36.53
	June 27	2,263	12	72	31.43
	July 01	2,854	15	90	31.71
	July 04	0	0	0	0
	Aug. 08	41	6	48	1.14
	Aug. 12	45	14	84	0.54
	Aug. 15	9	11	66	0.14
Total		8,270	23	474	17.44
1986	June 26	439	3	18	24.39
	June 30	1,619	13	78	20.76
	July 03	1,249	8	48	26.02
	July 07	387	2	12	32.25
	July 10	1,282	6	36	35.61
	Aug. 07	0	8	48	0.00
	Aug. 11	23	10	60	0.38
	Aug. 13	13	10	60	0.22
	Aug. 15	0	27	162	0.00
	Aug. 18	0	8	48	0.00
	Aug. 21	0	6	36	0.00
Total		5,012	43	606	8.27
1987	July 03	3,200	15	90	35.56
	July 07	4,152	22	132	31.45
	Aug. 13	304	14	84	3.62
	Aug. 17	102	14	84	1.21
	Aug. 19	39	13	78	0.50
	Aug. 21	40	18	108	0.37
Total		1,971	29	576	13.61

-Continued-

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1988	June 24	4,232	13	78	54.26
	June 28	6,087	17	102	59.68
	July 02	8,155	19	114	71.54
	Aug 08	308	14	84	3.67
	Aug 10	312	16	96	3.25
	Aug 12	244	20	120	2.03
	Aug 15	144	21	126	1.14
	Aug 18	116	15	90	1.29
	Aug 20	94	17	102	0.92
Total		19,692	29	912	21.97
1989	June 30	7,353	15	120	61.28
	July 03	5,101	18	108	47.23
	July 05	3,542	14	84	42.17
	July 11	4,580	14	84	54.52
	Aug 07	238	22	132	1.80
	Aug 09	114	18	108	1.06
	Aug 15	7	15	90	0.08
	Aug 18	11	20	120	0.09
Total		20,946	30	846	26.03
1990	June 29	3,838	14	84	45.69
	July 05	4,397	15	90	48.86
	July 09	5,163	17	102	50.46
	July 14	6,999	17	136	51.46
	Aug 06	742	15	90	8.24
	Aug 10	550	15	90	6.11
	Aug 13	276	16	96	2.88
	Aug 16	105	17	153	0.69
	Aug 20	12	18	108	0.11
	Aug 27	3	17	102	0.03
Total		13,816	22	1,045	13.59

Appendix B.16

Comparative coho salmon catches by fishing period by
year in District 2, Middle Kuskokwim River,
1985 -1990.

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1985	June 20	0	8	48	0.00
	June 24	0	11	66	0.00
	June 27	0	12	72	0.00
	July 01	0	15	90	0.00
	July 04	0	0	0	0
	Aug. 08	739	6	48	20.53
	Aug. 12	2,914	14	84	34.69
	Aug. 15	2,005	11	66	30.38
Total		5,658	23	474	11.94
1986	June 26	0	3	18	0.00
	June 30	0	13	78	0.00
	July 03	0	8	48	0.00
	July 07	0	2	12	0.00
	July 10	0	6	36	0.00
	Aug. 07	2,445	8	48	50.94
	Aug. 11	2,677	10	60	44.62
	Aug. 13	2,787	10	60	46.45
	Aug. 15	5,761	27	162	35.56
	Aug. 18	1,804	8	48	37.58
	Aug. 21	1,325	6	36	36.81
Total		16,799	43	606	27.72
1987	July 03	0	15	90	0.00
	July 07	0	22	132	0.00
	Aug. 13	2,273	14	84	27.06
	Aug. 17	3,374	14	84	40.17
	Aug. 19	3,928	13	78	50.36
	Aug. 21	4,571	18	108	42.32
Total		14,146	29	576	24.56

-Continued-

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1988	June 24	0	13	78	0.00
	June 28	0	17	102	0.00
	July 02	0	19	114	0.00
	Aug 08	1,465	14	84	17.44
	Aug 10	3,823	16	96	39.82
	Aug 12	5,216	20	120	43.47
	Aug 15	2,317	21	126	18.39
	Aug 18	1,485	15	90	16.50
	Aug 20	1,573	17	102	15.42
Total		19,692	29	912	16.78
1989	June 30	0	15	120	0.00
	July 03	0	18	108	0.00
	July 05	0	14	84	0.00
	July 11	0	14	84	0.00
	Aug 07	6,607	22	132	50.05
	Aug 09	5,714	18	108	52.91
	Aug 15	1,867	15	90	20.74
	Aug 18	2,733	20	120	22.78
Total		16,921	30	846	20.00
1990	Aug 06	1,111	15	90	12.34
	Aug 10	1,946	15	90	21.62
	Aug 13	4,192	16	96	43.67
	Aug 16	2,239	17	153	14.63
	Aug 20	2,548	18	108	23.59
	Aug 27	1,780	17	102	17.45
Total		22,085	22	639	34.56

<u>YEAR</u>	<u>COMMERCIAL HARVEST^a</u>	<u>ESTIMATED SUBSISTENCE HARVEST^b</u>	<u>TOTAL UTILIZATION</u>
1960	5,969	20,361	26,330
1961	18,918	30,910	49,828
1962	15,341	14,642	29,983
1963	12,016	37,246	49,262
1964	17,149	29,017	46,166
1965	21,989	27,143	49,132
1966	25,545	49,606	75,151
1967	29,986	57,875	87,861
1968	34,278	30,230	64,508
1969	43,997	40,138	84,135
1970	39,290	69,204	108,494
1971	40,274	42,926	83,200
1972	39,454	40,145	79,599
1973	32,838	38,526	71,364
1974	18,664	26,665	45,329
1975	21,720	47,784	69,504
1976	30,735	58,185	88,920
1977	35,830	55,577	91,407
1978	45,641	35,881	81,522
1979	38,966	55,524	94,490
1980	35,881	59,900	95,781
1981	47,663	59,669	107,332
1982	48,234	53,310	101,544
1983	33,174	52,000	85,174
1984	31,742	57,000	88,742
1985	37,889	42,277	80,166
1986	19,414	51,019	70,433
1987	36,179	67,352	103,504
1988	55,716	53,877	109,593
1989	43,217	73,035	116,252
1990 ^c	53,504	57,564 ^d	111,068
Ten Year Average (1980-1989)	38,910	56,944	95,852

^a District 1, 2 and 3.

^b Estimated subsistence harvest expanded from villages surveyed.

^c Preliminary harvest figures.

^d Previous five year average harvest since subsistence catch not available at this time.

Appendix B.18

Chinook salmon sex ratios and proportion of females with gill net marks, Kogrukluk weir, 1979-1990.

<u>Year</u>	<u>Escapement Estimate</u>	<u>Females</u>	<u>Sex Ratio (% female)</u>	<u>% of females with gill net marks</u>
1979	11,299	1,786	17.6	11.03
1980	6,572	1,045	15.9	a
1981	16,820	7,905	47.0	12.47
1982	12,185	5,995	49.2	12.99
1983	2,992	865	28.9	16.49
1984	4,928	1,119	22.7	11.08
1985	4,438	1,429	32.2	18.99
1986	4,296	987	23.0	19.43
1987 ^b	4,063			
1988	11,194	3,848	34.4	13.34
1989	11,940	4,127	34.6	16.46
1990	10,219	2,289	22.5	14.35
1979-84 Average			30.2	10.68
1985-90 Average			29.3	16.51

a Gill net mark data was not reported

b Sample size too small to assess sex ratio and percentage of gill net marks

Appendix B.19 Estimated swimming speed of salmon in the Kuskokwim River.

<u>Tagged at Tuluksak, 1961^a</u>	<u>AVG/DAY</u>	<u>RANGE</u>
Chinook Salmon	11.5	6.0 - 16.0
Sockeye Salmon	7.7	4.9 - 16.0
Coho Salmon	9.7	3.6 - 13.2
Chum Salmon	12.2	3.4 - 48.0
Pink Salmon	13.2	3.0 - 26.0

<u>Tagged at Tuluksak, 1962^b</u>		
Chinook Salmon	7.07	
Sockeye Salmon	11.16	
Coho Salmon	N/A	
Chum Salmon	13.66	
Pink Salmon	14.22	

Note comparison of peak catch indicated chinook salmon travel time of 20 miles per day.

<u>Tagged at Enaravak, 7 mi upstream Eek Island^c</u>		
Chinook Salmon	7.7	3.3 - 19.6
Sockeye Salmon	7.0	5.1 - 10.6
Chum Salmon	6.2	5.1 - 36.0

Peak subsistence catches at seven locations Napakiak to Crooked Creek indicate migration speed in 1962 was:

Chinook Salmon	16.7
Sockeye Salmon	23.0
Chum Salmon	13.6

<u>Tagged at Eek Test Fishery, Bethel Test Fishery, and vicinity of Bethel, 1989^d</u>		
Chinook Salmon	8.4	0.25 - 34.0

a Source: AYK Regional Kuskokwim Stock Separation Report No. 1

b Source: AYK Regional Kuskokwim Stock Separation Report No. 2

c Source: AYK Regional Kuskokwim Stock Separation Report No. 3

d source: Pilot Inventory of the Chinook Salmon Stocks of the Kuskokwim River Basin, Yukon Delta National Wildlife Refuge, 1989 Preliminary Summary

Appendix B.20

Lower Kuskokwim River, District 1, commercial effort
1970 - 1990.

<u>YEAR</u>	<u>UNRESTRICTED MESH SEASON</u>	<u>RESTRICTED MESH SEASON</u>	<u>COHO SALMON SEASON</u>				<u>TOTAL</u>
1970	361	a			266		387
1971	418	216			83		422
1972	405	176			245		425
1973	456	341			411		530
1974	606	467			516		666
1975	472	540			533		737
1976	561	517			516		674
1977	563	522			572		653
1978	615	617			597		723
1979	591	617			613		685
1980	553	579			586		663
1981	589	613			586		679
1982	610	576			596		686
1983	544	619			577		679
1984	520	587			619		654
1985	b	598			627		654
1986	b	631			663		688
1987	b	680			694		703
1988	b	c			c		746
Number of Permits Landing Each Species							
	Chinook	Sockeye	Coho	Pink	Chum	Roe	
1989	695	688	732	261	719	22	745
1990	724	722	714	526	736	1	744
Ten Year Average (1980-1989)							690

a No commercial salmon season.

b No unrestricted mesh season.

c Fishery continued without interruption

Appendix B.21

Middle Kuskokwim River, District 2, commercial effort
1970 - 1990.

<u>YEAR</u>	<u>UNRESTRICTED MESH SEASON</u>	<u>RESTRICTED MESH SEASON</u>	<u>COHO SALMON SEASON</u>			<u>TOTAL</u>	
1970	10	a	11			18	
1971	22	a	a			22	
1972	12	a	a			12	
1973	28	a	a			28	
1974	36	a	16			37	
1975	38	a	a			38	
1976	55	a	11			57	
1977	83	54	24			105	
1978	28	a	16			43	
1979	41	a	20			43	
1980	37	21	12			43	
1981	153	11	16			153	
1982	38	50	25			60	
1983	14	42	9			43	
1984	15	49	32			58	
1985	b	17	16			23	
1986	b	21	35			43	
1987	b	24	20			29	
1988	b	19	21			29	
Number of Permits Landing Each Species							
	Chinook	Sockeye	Coho	Pink	Chum	Roe	
1989	20	19	29	8	26	2	30
1990	19	19	21	13	20	0	22
Ten Year Average (1980-1989)							51

a No commercial salmon season.

b No unrestricted mesh season.

APPENDIX C

Appendix C.1

District 4 Quinhagak Chinook Salmon commercial catch and escapement age composition, 1982 - 1990.

		<u>Total years of life at maturity</u>					
	Sample Size	3	4	5	6	7+	Total
1982							
Commercial							
Male		0.0	3.6	33.3	9.4	1.3	47.6
Female		0.0	1.3	31.1	18.4	1.6	52.4
Combined	309	0.0	4.9	64.4	27.8	2.9	100.0
Commercial Catch ^b		0	1,083	14,236	6,145	641	22,106
1983							
Commercial							
Male		0.4	25.9	6.1	27.3	1.5	61.2
Female		0.0	0.1	0.8	37.0	0.9	38.8
Combined	758	0.4	26.0	6.9	64.3	2.4	100.0
Commercial Catch ^b		186	12,060	3,201	29,826	1,113	46,385
Escapement							
Male		0.3	6.7	10.9	29.7	1.0	48.6
Female		0.0	0.2	2.4	45.8	3.0	51.4
Combined	580	0.3	6.9	13.3	75.5	4.0	100.0
Escapement ^c		148	3,403	6,558	37,231	1,972	49,312
1984							
Commercial							
Male		0.0	12.0	52.7	14.8	3.9	83.4
Female		0.0	0.0	1.5	10.1	5.0	16.6
Combined	583	0.0	12.0	54.2	24.9	8.9	100.0
Commercial Catch ^b		0	4,038	18,239	8,379	2,995	33,652
Escapement							
Male		1.5	5.0	34.0	20.0	2.6	63.1
Female		0.0	0.0	4.3	28.5	4.1	36.9
Combined	545	1.5	5.0	38.3	48.5	6.7	100.0
Escapement ^c		574	1,912	35,973	14,648	18,549	38,245

-continued-

Appendix C.1 (page 2 of 3)

		Total years of life at maturity						
		Sample Size	3	4	5	6	7+	Total
<hr/>								
1985								
Commercial								
Male			0.0	19.3	20.9	26.7	1.6	59.1
Female			0.0	0.0	2.5	28.3	0.7	40.9
Combined	569		0.0	19.3	23.4	55.0	2.3	100.0
Commercial Catch ^b			0	5,867	7,114	16,721	699	30,401
Escapement								
Male			0.6	5.3	11.0	30.6	0.9	48.4
Female			0.0	0.0	3.7	45.5	2.4	51.6
Combined	661		0.6	5.3	14.7	76.1	3.3	100.0
Escapement ^c			215	1,895	5,256	27,210	1,180	35,755
<hr/>								
1986								
Commercial								
Male			2.0	6.0	43.0	16.0	4.0	71.0
Female			0.0	0.0	2.0	19.0	8.0	29.0
Combined	502		2.0	6.0	45.0	35.0	12.0	100.0
Commercial Harvest			457	1,370	10,276	7,992	2,740	22,835
Escapement								
Male			1.5	6.0	21.2	18.1	6.0	52.8
Female			0.0	0.0	6.5	26.6	14.1	47.2
Combined	199		1.5	6.0	27.7	44.7	20.1	100.0
Escapement ^c			343	1,375	6,349	10,246	4,607	22,922
<hr/>								
1987								
Commercial								
Male			0.4	26.7	17.9	36.4	1.3	82.7
Female			0.0	0.0	0.0	16.4	1.0	17.3
Combined	525		0.4	26.7	17.9	52.8	2.3	100.0
Commercial Catch			99	6,939	4,659	13,730	595	26,022
Escapement								
Male			0.5	2.9	10.8	34.6	3.1	52.0
Female			0.0	0.8	3.7	39.4	3.9	48.0
Combined			0.5	3.7	14.4	74.0	7.1	100.0
Escapement ^c	381		44	2,944	1,974	5,823	253	11,029

-continued-

Appendix C.1 (page 3 of 3)

<u>Total years of life at maturity</u>							
	Sample Size	3	4	5	6	7+	Total
1988							
Commercial							
Male		0.0	19.8	24.2	12.8	3.0	59.8
Female		0.0	2.7	9.5	18.1	9.8	40.2
Combined	592	0.0	22.5	33.6	30.9	12.8	100.0
Commercial Catch		0	3,119	4,666	4,292	1,782	13,883
Escapement samples not collected							

- a) Total represents number of freshwater and marine annuli, plus one.
b) Based on commercial catch samples.
c) Escapement numbers based on Kanektok River Sonar estimates.

Appendix C.2

Kanektok River peak aerial surveys by species,
1959 - 1990^a.

<u>Year</u>	<u>SPECIES</u>			
	<u>Chinook</u>	<u>Sockeye</u>	<u>Coho</u>	<u>Chum</u>
1960	6,047	34,900		36,100
1961				
1962	935	43,108		
1963				
1964				
1965				
1966	3,718			28,800
1967				
1968	4,170	8,000		14,000
1969				
1970	4,112	3,028		80,100
1971				
1972				
1973	814			
1974				
1975		6,018		
1976		2,936		8,697
1977	5,787	6,304		32,157
1978 ^b	19,180	44,215		229,290
1979				
1980	6,172	113,931	69,325	25,950
1981 ^c	15,900	49,175		71,840
1982 ^d	8,142	55,940		
1983	8,890	2,340		9,360
1984 ^e	12,182	30,840	46,830	48,360
1985	13,465	16,270		14,385
1986	3,643	14,949		16,790
1987	4,223	51,753	20,056	9,420
1988	11,140	30,440		20,063
1989	7,914	14,735	1,755	6,270
1990	2,563	32,082		2,475
AVERAGE:	7,316	29,524	34,491	38,473
OBJECTIVE:	5,000	15,000		30,500

a Peak aerial surveys are those rated fair or good surveys obtained between 20 July and 5 August for chinook and sockeye salmon, 20-31 July for chum salmon, and 20 August and 5 September for coho salmon. Some surveys which do not meet these criteria may be referenced in this table; test are footnoted.

b Chum salmon count excluded from escapement objective calculation due to exceptional magnitude.

c Poor survey for chinook, sockeye, chum salmon.

d Late Survey for chinook, sockeye salmon (after 5 August).

e Poor coho survey.

Appendix C.3

Historical age composition percentage, sockeye salmon, Quinhagak commercial catch and escapement, 1982 - 1988.

Age Composition		Total years of life at maturity ^a				Total
		3	4	5	6	
1982	Sample Size					
Commercial						
Male		0.0	17.2	38.0	0.0	55.2
Female		0.0	13.3	31.5	0.0	44.8
Combined	203	0.0	30.5	69.5	0.0	100.0
Commercial Catch ^b		0	7,834	17,851	0	25,685
Escapement sockeye salmon samples were not collected.						
1983						
Commercial						
Male		0.0	23.0	20.9	4.0	47.9
Female		0.0	31.0	18.5	2.6	52.1
Combined	470	0.0	54.0	39.4	6.6	100.0
Commercial Catch ^b		0	5,542	4,044	677	10,263
Escapement sockeye salmon samples were not collected.						
1984						
Commercial						
Male		0.0	17.1	34.5	4.9	56.5
Female		0.0	10.0	30.1	3.4	43.5
Combined	531	0.0	27.1	64.6	8.3	100.0
Commercial Catch ^b		0	4,677	11,149	1,432	17,258
Escapement						
Male		0.3	22.8	36.7	1.5	61.3
Female		0.0	8.9	29.0	0.8	38.7
Combined	382	0.3	31.7	65.7	2.3	100.0
Escapement ^c		164	17,357	35,973	1,259	54,754
1985						
Commercial						
Male		0.0	9.3	40.4	1.6	59.1
Female		0.0	11.9	35.3	1.6	40.9
Combined	569	0.0	21.2	75.6	3.2	100.0
Commercial Catch ^b		0	1,666	5,957	252	7,876
1986						
Commercial						
Male		0.0	11.7	39.2	0.2	51.1
Female		0.0	9.8	39.2	0.0	48.9
Combined	314	0.0	21.4	78.3	0.2	100.0
Commercial Catch ^b		0	4,607	16,827	50	21,484
Escapement						
Male		0.0	10.1	26.6	0.0	36.7
Female		0.0	10.1	50.6	2.6	63.3
Combined		0.0	20.2	77.2	2.6	100.0
Escapement Estimate ^c		0	1,565	5,983	202	7,751

Appendix C.3 (page 2 of 2)

Age Composition		Total years of life at maturity ^a				Total
		3	4	5	6	
<hr/>						
1986						
Commercial						
Male		0.0	11.7	39.2	0.2	51.1
Female		0.0	9.8	39.2	0.0	48.9
Combined	314	0.0	21.4	78.3	0.2	100.0
<hr/>						
Commercial Catch ^b		0	4,607	16,827	50	21,484
<hr/>						
Escapement						
Male		0.0	10.1	26.6	0.0	36.7
Female		0.0	10.1	50.6	2.6	63.3
Combined		0.0	20.2	77.2	2.6	100.0
<hr/>						
Escapement Estimate ^c		0	1,565	5,983	202	7,751
<hr/>						
1987	Sample					
Commercial	Size					
Male		0	20.3	38.6	0	58.9
Female		0	10.5	30.7	0	41.1
Combined	153	0	30.7	69.3	0	100.0
<hr/>						
Commercial Catch ^b		0	1,993	4,496	0	6,489
<hr/>						
Escapement						
Male		0	34.6	12.2	0	46.8
Female		0	46.8	6.5	0	53.3
Combined	295	0	81.4	18.7	0	100.0
<hr/>						
Escapement ^c		0	8,563	1,967	0	10,520
<hr/>						
1988						
Commercial						
Male		0.1	6.4	50.4	3.3	60.4
Female		0	3.8	32.8	3.0	39.6
Combined	748	0.1	10.1	83.3	6.3	100.0
<hr/>						
Commercial Catch ^b		29	2,190	17,954	1,384	21,557

Escapement samples not collected.

^a Age classes are a total of fresh water and marine growth.

^b Age classes based on commercial catch samples.

^c Age classes based on escapement samples. Escapement estimate based on the Kanektok River Sonar/aerial surveys.

^d Preliminary data.

Appendix C.4

Historical age composition percentage, chum salmon, Quinhagak commercial harvest and escapement, 1982 - 1990.

Age Composition		Total years of life at maturity ^a				Total
		3	4	5	6	
1982	Sample Size					
Commercial						
Male		1.0	24.6	13.7	1.0	40.3
Female		0.0	36.7	19.6	1.4	59.7
Combined	414	1.0	63.3	33.3	2.4	100.0
Commercial Catch ^b		333	21,108	11,104	800	33,346
Escapement samples were not collected.						
1983						
Commercial						
Male		0.0	24.7	16.0	0.6	41.3
Female		0.6	34.9	22.8	0.4	58.7
Combined	482	0.6	59.6	38.8	1.0	100.0
Commercial Catch ^b		139	13,762	8,959	231	23,090
Escapement						
Male		0.0	15.5	37.6	1.0	54.1
Female		0.2	21.9	23.8	0.0	45.9
Combined	401	0.2	37.4	61.4	1.0	100.0
Escapement ^c		108	20,157	33,092	539	53,895
1984						
Commercial						
Male		0.2	33.8	13.4	0.0	47.4
Female		0.0	39.9	12.1	0.6	52.6
Combined	464	0.2	73.7	25.5	0.6	100.0
Commercial Catch ^b		101	37,162	12,858	303	50,424
Escapement						
Male		0.1	38.1	17.1	1.2	56.5
Female		0.1	32.0	11.1	0.3	43.5
Combined	772	0.2	70.1	28.2	1.5	100.0
Escapement ^c		400	140,298	56,439	3,002	200,140
1985						
Commercial						
Male		0.0	25.5	21.4	0.2	59.1
Female		0.0	27.5	25.3	0.0	40.9
Combined	458	0.0	53.0	46.7	0.2	100.0
Commercial Catch ^b		0	1,666	5,957	252	7,876
Escapement						
Male		0.2	24.1	27.1	0.0	51.4
Female		0.2	25.7	22.7	0.0	48.6
Combined	440	0.4	49.8	49.8	0.0	100.0
Escapement ^c		61	7,632	7,632	0	15,325

-continued-

Age Composition		Total years of life at maturity ^a				Total
		3	4	5	6	
<hr/>						
1986	Sample					
Commercial	Size					
Male		0.0	22.6	17.1	0.0	39.7
Female		0.0	41.7	18.6	0.0	60.3
Combined	314	0.0	64.3	35.7	0.0	100.0
Commercial Catch ^b		0	19,100	10,600	0	29,700
Escapement						
Male		0.2	27.1	28.8	0.9	57.0
Female		0.0	23.0	19.3	0.7	43.0
Combined	431	0.2	50.1	48.1	1.6	100.0
Escapement ^c		38	9,422	9,046	302	18,808
<hr/>						
1987						
Commercial						
Male		0	20.7	35.3	0	56.0
Female		0	17.4	26.6	0	44.0
Combined	241	0	38.1	61.9	0	100.0
Commercial Catch ^b		0	3,267	5,290	0	8,557
Escapement						
Male		0	14.0	32.0	2.0	48.0
Female		0	22.0	30.0	0	52.0
Combined	150	0	37.0	62.0	2.0	100.0
Escapement ^c		0	4,118	6,901	223	11,132
<hr/>						
1988						
Commercial						
Male		0.7	34.1	14.8	0.8	50.4
Female		.5	31.0	16.9	1.2	49.6
Combined	593	1.2	65.1	31.7	2.0	100.0
Commercial Catch ^b		345	19,020	9,264	591	29,220
Escapement samples not collected.						
<hr/>						
1989 ^d						
Commercial						
Male		0	23.4	24.2	0.4	48.0
Female		0	26.1	24.4	0.6	51.1
Combined	641	0	49.5	48.6	1.0	100.0
Commercial Catch ^b		0	19,698	19,308	389	39,395
Escapement samples not collected.						

^a Age classes are a total of fresh water and marine growth.

^b Age classes based on commercial catch samples.

^c Age classes based on escapement samples. Escapement estimate based on the surveys.

^d Preliminary data.

Kanektok River Sonar/aerial

Appendix C.5

Summary of historical commercial harvest by
period, Quinhagak District, sockeye salmon,
1981-1990.

<u>DATE</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
6/12	1	0	0	0	0.00000
6/13	2	14	151	83	0.00084
6/14	1	384	384	384	0.00130
6/15	2	89	134	112	0.00246
6/16	3	0	277	142	0.00521
6/17	1	1119	1119	1119	0.00956
6/18	4	355	468	430	0.02190
6/19	2	171	741	456	0.02630
6/20	2	111	367	239	0.02941
6/21	3	1039	2141	1505	0.04673
6/22	2	379	746	563	0.06042
6/23	3	343	1741	1152	0.07861
6/24	2	638	1595	1117	0.09292
6/25	4	732	1667	1333	0.12856
6/26	2	1717	2300	2009	0.14763
6/27	2	461	543	502	0.15878
6/28	3	1908	2413	2096	0.18880
6/29	1	0	0	0	0.18880
6/30	3	1360	2601	2019	0.23207
7/1	1	975	975	975	0.24444
7/2	5	1242	5654	2754	0.29048
7/3	3	2244	3604	3013	0.35737
7/4	2	627	1201	914	0.37873
7/5	5	1157	6464	2932	0.42402
7/6	1	1126	1126	1126	0.43053
7/7	5	1211	8326	3790	0.49349
7/8	2	1289	2453	1871	0.52123
7/9	4	1532	7313	3598	0.56517
7/10	2	2229	2786	2508	0.58899
7/11	5	1901	7672	3513	0.67501
7/12	2	1468	1601	1535	0.68837
7/13	3	1842	10755	4958	0.72507
7/14	5	878	3465	2102	0.78122
7/15	2	1240	3099	2170	0.81489
7/16	3	564	8537	3465	0.83339
7/17	2	937	1502	1220	0.84581
7/18	4	657	1454	1032	0.87261
7/19	2	866	12850	6858	0.89134
7/20	2	477	1722	1100	0.90406
7/21	4	477	989	739	0.91737
7/22	2	799	1312	1056	0.93274
7/23	3	328	4361	1683	0.94132
7/24	2	215	907	561	0.94761

-continued-

Appendix C.5 (page 2 of 2)

<u>DATE</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
7/25	4	0	2681	848	0.95447
7/26	1	0	0	0	0.95447
7/27	6	0	2096	476	0.96154
7/28	1	102	102	102	0.96194
7/29	3	126	429	256	0.96663
7/30	3	19	1516	549	0.96899
7/31	2	97	210	154	0.97057
8/1	5	42	757	228	0.97444
8/2	2	38	94	66	0.97505
8/3	6	30	408	167	0.98012
8/4	3	3	93	55	0.98085
8/5	4	6	293	124	0.98430
8/6	5	16	254	99	0.98736
8/7	2	30	240	135	0.98890
8/8	6	0	198	54	0.98974
8/9	2	6	34	20	0.98993
8/10	5	10	77	42	0.99177
8/11	3	6	28	20	0.99203
8/12	4	1	103	54	0.99341
8/13	5	0	89	30	0.99401
8/14	3	1	44	21	0.99436
8/15	4	12	42	29	0.99513
8/16	4	0	39	13	0.99527
8/17	5	1	71	25	0.99649
8/18	4	6	36	16	0.99666
8/19	5	2	19	9	0.99703
8/20	4	3	42	20	0.99726
8/21	4	0	23	8	0.99750
8/22	4	1	32	11	0.99786
8/23	4	1	51	15	0.99798
8/24	4	0	16	6	0.99811
8/25	4	1	28	10	0.99843
8/26	4	0	14	5	0.99857
8/27	4	0	30	10	0.99865
8/28	3	0	7	3	0.99877
8/29	4	1	7	5	0.99889
8/30	2	0	0	0	0.99889
8/31	4	0	20	8	0.99926
9/1	4	0	8	3	0.99931
9/2	4	0	14	5	0.99954
9/3	3	0	1	1	0.99955
9/4	3	0	18	8	0.99986
9/5	4	0	16	4	0.99993
9/6	2	0	1	1	0.99995
9/7	4	0	5	1	0.99997
9/8	3	0	3	1	1.00000

Appendix C.6 Summary of historical commercial harvest by period,
Quinhagak District, chum salmon, 1981-1990.

<u>Date</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
6/12	1	0	0	0	0.00000
6/13	2	84	1092	588	0.00456
6/14	0	0	0	0	0.00456
6/15	2	1008	1122	1065	0.00982
6/16	3	0	847	545	0.01683
6/17	1	1556	1556	1556	0.02201
6/18	3	1162	2611	1861	0.04653
6/19	2	1198	1913	1556	0.05641
6/20	2	746	968	857	0.06451
6/21	2	2278	4471	3375	0.08195
6/22	2	1051	2177	1614	0.10013
6/23	3	1103	3226	2034	0.12251
6/24	2	1403	3228	2316	0.14476
6/25	3	1711	5417	3578	0.18642
6/26	2	1529	4329	2929	0.20693
6/27	2	1855	1874	1865	0.22605
6/28	3	2458	5449	4203	0.26533
6/29	1	0	0	0	0.26533
6/30	3	2066	4903	3610	0.32042
7/1	1	2131	2131	2131	0.33202
7/2	4	1972	6034	3961	0.37567
7/3	3	1788	3743	2497	0.42015
7/4	2	2333	3155	2744	0.44855
7/5	4	1820	6778	3667	0.49239
7/6	1	2953	2953	2953	0.49854
7/7	4	2939	4016	3433	0.54885
7/8	2	3231	3672	3452	0.58040
7/9	3	3830	7408	5616	0.62095
7/10	2	4022	4774	4398	0.64946
7/11	4	2552	4567	3256	0.69887
7/12	2	3211	3742	3477	0.72039
7/13	2	4270	7438	5854	0.74530
7/14	5	732	3080	1922	0.78313
7/15	2	2796	10756	6776	0.82075
7/16	2	1784	2193	1989	0.83199
7/17	2	2326	3218	2772	0.84740
7/18	4	1310	4343	2771	0.88448
7/19	1	2339	2339	2339	0.89227
7/20	2	2256	3934	3095	0.90544
7/21	4	1143	1941	1573	0.92653
7/22	2	1668	2219	1944	0.94068
7/23	2	791	1316	1054	0.94621
7/24	2	499	1280	890	0.95029
7/25	3	0	1397	737	0.95646

-continued-

Appendix C.6 (page 2 of 2)

<u>Date</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
7/26	1	0	0	0	0.95646
7/27	5	0	677	384	0.96269
7/28	1	333	333	333	0.96380
7/29	3	353	797	542	0.96909
7/30	2	173	232	203	0.97024
7/31	3	5	191	128	0.97119
8/1	4	246	429	299	0.97613
8/2	2	153	185	169	0.97716
8/3	5	110	580	259	0.98308
8/4	3	4	134	85	0.98387
8/5	4	98	357	224	0.98736
8/6	4	52	285	136	0.99184
8/7	2	101	114	108	0.99236
8/8	5	0	132	57	0.99322
8/9	2	11	33	22	0.99335
8/10	5	16	108	66	0.99551
8/11	3	4	37	23	0.99574
8/12	4	15	53	40	0.99636
8/13	4	2	53	21	0.99676
8/14	3	13	37	25	0.99700
8/15	4	6	53	28	0.99740
8/16	3	2	23	11	0.99755
8/17	5	2	50	21	0.99825
8/18	3	7	9	8	0.99834
8/19	5	5	15	10	0.99862
8/20	3	3	14	9	0.99871
8/21	4	2	11	7	0.99887
8/22	4	1	18	9	0.99902
8/23	3	3	10	7	0.99911
8/24	4	0	7	4	0.99921
8/25	4	0	5	4	0.99927
8/26	4	0	9	5	0.99942
8/27	3	0	2	1	0.99944
8/28	3	2	4	3	0.99951
8/29	4	0	3	2	0.99954
8/30	2	0	1	1	0.99954
8/31	4	0	10	4	0.99969
9/1	4	0	2	1	0.99970
9/2	4	0	7	3	0.99980
9/3	3	0	0	0	0.99980
9/4	3	0	13	4	0.99997
9/5	4	0	5	1	0.99999
9/6	2	0	0	0	0.99999
9/7	4	0	2	1	1.00000
9/8	3	0	0	0	1.00000

Appendix C.7

Quinhagak District commercial salmon harvest, 1960-1990.

<u>Year</u>	<u>Chinook</u>	<u>Sockeye</u>	<u>Coho</u>	<u>Pink</u>	<u>Chum</u>	<u>Total</u>
1960	0	5,649	3,000	0	0	8,649
1961	4,328	2,308	46	90	18,864	25,636
1962	5,526	10,313	0	4,340	45,707	65,886
1963	6,555	0	0	0	0	6,555
1964	4,081	13,422	379	939	707	19,528
1965	2,976	1,886	0	0	4,242	9,104
1966	278	1,030	0	268	2,610	4,186
1967	0	652	1,926	0	8,087	10,665
1968	8,879	5,884	21,511	75,818	19,497	131,589
1969	16,802	3,784	15,077	953	38,206	74,822
1970	18,269	5,393	16,850	15,195	46,556	102,263
1971	4,185	3,118	2,982	13	30,208	40,506
1972	15,880	3,286	376	1,878	17,247	38,667
1973	14,993	2,783	16,515	277	19,680	54,248
1974	8,704	19,510	10,979	43,642	15,298	98,133
1975	3,928	8,584	10,742	486	35,233	58,973
1976	14,110	6,090	13,777	31,412	43,659	109,048
1977	19,090	5,519	9,028	202	43,707	77,546
1978	12,335	7,589	20,114	47,033	24,798	111,869
1979	11,144	18,828	47,525	295	25,995	103,787
1980	10,387	13,221	62,610	21,671	65,984	173,873
1981	24,524	17,292	47,557	160	53,334	142,867
1982	22,106	25,685	73,652	11,838	33,346	166,627
1983	46,385	10,263	32,442	168	23,090	112,348
1984	33,652	17,258	135,342	16,249	50,424	252,925
1985	30,401	7,876	29,992	28	20,418	88,715
1986	22,835	21,484	57,544	8,700	29,700	140,263
1987	26,022	6,489	50,070	66	8,557	91,204
1988	13,872	21,534	68,591	21,258	29,183	154,438
1989	20,820	20,582	44,607	273	39,395	125,677
1990 ^a	27,644	83,681	26,926	12,056	47,717	198,024
Ten Year Average (1980-1989)	25,100	16,168	60,240	18,354 ^b	35,343	144,894

^a Preliminary catch numbers.^b Even years only.

Appendix C.8

Summary of historical commercial harvest by period,
Quinhagak District, chinook salmon, 1981-1990.

<u>Date</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
6/12	1	0	0	0	0.00000
6/13	2	1716	7720	4718	0.03223
6/14	0	0	0	0	0.03223
6/15	2	2948	3415	3182	0.06381
6/16	3	0	7835	3005	0.09201
6/17	1	3527	3527	3527	0.10974
6/18	3	6694	11997	8768	0.21219
6/19	2	3525	5801	4663	0.25923
6/20	2	803	6617	3710	0.28984
6/21	2	4268	5458	4863	0.32931
6/22	2	4002	10586	7294	0.39265
6/23	3	2039	11652	6656	0.46198
6/24	2	5406	6698	6052	0.51363
6/25	3	3719	4539	4123	0.56344
6/26	2	1703	1741	1722	0.58101
6/27	2	3795	9711	6753	0.61815
6/28	3	1438	4089	2937	0.66894
6/29	1	0	0	0	0.66894
6/30	3	690	4496	2124	0.70009
7/1	1	3752	3752	3752	0.71380
7/2	4	1204	1902	1713	0.74966
7/3	3	2018	2771	2369	0.78417
7/4	2	2727	4068	3398	0.80557
7/5	4	850	2710	1360	0.83517
7/6	1	996	996	996	0.83968
7/7	4	960	1566	1319	0.86242
7/8	2	918	2407	1663	0.87856
7/9	3	739	1259	963	0.89054
7/10	2	646	736	691	0.89757
7/11	4	621	1545	1160	0.91518
7/12	2	450	687	569	0.92103
7/13	2	639	1011	825	0.92727
7/14	5	220	1351	651	0.94184
7/15	2	1236	1306	1271	0.95221
7/16	2	441	533	487	0.95635
7/17	2	222	290	256	0.95874
7/18	4	202	845	438	0.96524
7/19	1	390	390	390	0.96720
7/20	2	412	490	451	0.97078
7/21	4	131	248	186	0.97506
7/22	2	211	629	420	0.97752
7/23	2	88	324	206	0.97903
7/24	2	83	187	135	0.98032
7/25	3	0	379	171	0.98266

-Continued-

<u>Date</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
7/26	1	0	0	0	0.98266
7/27	5	0	194	95	0.98472
7/28	1	56	56	56	0.98500
7/29	3	103	116	108	0.98661
7/30	2	73	104	89	0.98737
7/31	3	0	46	29	0.98780
8/1	4	54	153	92	0.98916
8/2	2	45	53	49	0.98967
8/3	5	40	160	80	0.99133
8/4	3	0	30	19	0.99162
8/5	4	40	141	74	0.99275
8/6	4	25	78	42	0.99346
8/7	2	27	43	35	0.99380
8/8	5	0	71	28	0.99456
8/9	2	6	22	14	0.99471
8/10	5	19	125	58	0.99576
8/11	3	6	15	10	0.99591
8/12	4	24	74	47	0.99673
8/13	4	0	36	15	0.99695
8/14	3	6	29	16	0.99716
8/15	4	8	43	29	0.99769
8/16	3	1	10	6	0.99776
8/17	5	2	66	24	0.99823
8/18	3	9	10	10	0.99838
8/19	5	3	51	19	0.99875
8/20	3	6	10	7	0.99884
8/21	4	4	13	7	0.99897
8/22	4	3	33	13	0.99918
8/23	3	1	5	4	0.99923
8/24	4	3	14	7	0.99936
8/25	4	1	16	7	0.99946
8/26	4	5	17	9	0.99966
8/27	3	3	4	3	0.99971
8/28	3	3	8	5	0.99977
8/29	4	1	7	4	0.99984
8/30	2	0	1	1	0.99984
8/31	4	0	3	2	0.99988
9/1	4	0	10	3	0.99991
9/2	4	0	4	2	0.99993
9/3	3	0	2	1	0.99995
9/4	3	2	2	2	0.99997
9/5	4	0	2	1	1.00000
9/6	2	0	1	1	1.00000
9/7	4	0	0	0	1.00000
9/8	3	0	0	0	1.00000

Appendix C.9

Quinhagak District commercial effort 1970-1990.

<u>YEAR</u>	<u>EFFORT^a</u>
1970	88
1971	61
1972	107
1973	109
1974	196
1975	127
1976	181
1977	258
1978	200
1979	206
1980	169
1981	186
1982	117
1983	226
1984	263
1985	300
1986	324
1987	310
1988	288
1989	227
1990	390
TEN YEAR AVERAGE (1980-1989)	241

a Permits that made at least one delivery during that year.

Appendix C.10

Summary of historical commercial harvest by
period, Quinhagak District, coho salmon,
1979-1990.

<u>Date</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
6/30	4	0	2	1	0.00000
7/1	1	0	0	0	0.00000
7/2	7	0	1	0	0.00000
7/3	3	0	0	0	0.00000
7/4	4	0	0	0	0.00000
7/5	5	0	0	0	0.00000
7/6	2	0	0	0	0.00000
7/7	6	0	0	0	0.00000
7/8	2	0	0	0	0.00000
7/9	6	0	4	1	0.00001
7/10	2	0	5	3	0.00002
7/11	7	0	9	2	0.00002
7/12	2	0	2	1	0.00003
7/13	4	0	7	2	0.00003
7/14	6	0	2	1	0.00004
7/15	2	0	18	9	0.00010
7/16	5	0	39	13	0.00015
7/17	2	4	14	9	0.00018
7/18	6	0	234	50	0.00042
7/19	2	11	88	88	0.00054
7/20	3	3	787	267	0.00114
7/21	5	0	366	126	0.00216
7/22	2	1	12	7	0.00220
7/23	5	0	1386	440	0.00376
7/24	2	47	63	55	0.00400
7/25	6	0	3482	842	0.00741
7/26	1	0	0	0	0.00741
7/27	7	0	5512	1053	0.01257
7/28	2	352	1214	783	0.01478
7/29	3	152	565	376	0.01694
7/30	5	0	3079	1603	0.02275
7/31	3	146	925	428	0.02553
8/1	7	0	5680	1674	0.03652
8/2	2	962	2806	1884	0.04249
8/3	7	592	5390	2149	0.05635
8/4	3	190	1755	936	0.06200
8/5	5	934	4517	2397	0.08610
8/6	7	2068	8436	4458	0.11756
8/7	2	693	8188	4441	0.13737
8/8	7	0	19215	6322	0.17635
8/9	2	5295	5676	5486	0.19593
8/10	6	2429	9428	5566	0.24609
8/11	4	3863	10076	7029	0.29429

-continued-

<u>Date</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
8/12	4	2857	3894	3287	0.32757
8/13	7	1561	10961	5464	0.36573
8/14	3	1671	3543	2784	0.38788
8/15	6	1603	15733	8426	0.44897
8/16	4	1403	4643	2556	0.46999
8/17	6	2008	9785	4610	0.50735
8/18	5	1008	9776	7817	0.56151
8/19	5	2532	5019	3884	0.60693
8/20	6	3958	8728	6199	0.64021
8/21	4	2110	3662	2946	0.66837
8/22	6	1972	5231	4008	0.70305
8/23	4	2400	5873	3605	0.72488
8/24	5	1708	8673	4029	0.75269
8/25	6	115	6095	4068	0.79122
8/26	4	1419	4825	3878	0.82198
8/27	6	1431	5975	3902	0.84478
8/28	3	1514	3737	2668	0.86319
8/29	7	0	3623	2889	0.89028
8/30	2	1054	9431	5243	0.90659
8/31	5	1524	3382	2488	0.92287
9/1	4	1407	2365	1901	0.93951
9/2	4	535	4065	2196	0.95790
9/3	4	600	2717	1589	0.96422
9/4	3	1177	2058	1675	0.97605
9/5	7	0	3799	1382	0.98606
9/6	2	950	1158	1054	0.99144
9/7	5	0	1798	692	0.99611
9/8	2	0	1262	631	1.00000

APPENDIX D

Appendix D.1 Peak aerial survey results, Goodnews River,
1980 - 1990.

<u>Year</u>	<u>Species</u>	<u>Goodnews River Goodnews Lake</u>	<u>Middle Fork River & Lakes</u>	<u>Total</u>
1980	Chinook	1,228	1,164	2,392
	Sockeye	41,576	18,596	60,172
	Chum	1,975	3,782	5,757
1981	Chinook	a	a	a
	Sockeye	a	a	a
	Chum	a	a	a
1982	Chinook	1,990	1,546	3,536
	Sockeye	19,160	2,327	21,487
	Chum	9,700	6,300	16,000
1983	Chinook	2,600	2,500	5,241
	Sockeye	9,650	5,900	15,600
	Chum	a	a	a
1984	Chinook	3,235	2,020	5,261
	Sockeye	9,240	12,897	22,137
	Chum	17,250	9,172	27,347
1985	Chinook	3,535	2,050	5,585
	Sockeye	2,843	2,710	5,553
	Chum	4,415	3,593	8,008
1986	Chinook	1,068	1,249	2,317
	Sockeye	8,960	16,990	25,950
	Chum	11,850	4,400	16,250
1987	Chinook	2,234	1,598	3,870
	Sockeye	19,786	9,033	28,819
	Chum	12,103	2,805	15,588
1988	Chinook	637	1,024	1,661
	Sockeye	5,880	5,831	11,711
	Chum	3,846	5,814	9,660
1989	Chinook	8	1,277	1,285
	Sockeye	30,764	1,145	31,909
	Chum	a	2,922	2,922
1990	Chinook	0	38	38
	Sockeye	22,100	1,092	23,192
	Chum	a	311	311

-continued-

Appendix D.1 (page 2 of 2)

		<u>Goodnews River</u>	<u>Middle Fork</u>	
		<u>Goodnews Lake</u>	<u>River & Lakes</u>	<u>Total</u>
Escapement	Chinook	1,600	800	2,400
Objective ^b	Sockeye	15,000	5,000	20,000
	Chum	17,000	4,000	21,000

^a Information not available.

^b Escapement objectives are preliminary and are subject to change as additional data becomes available. Escapement objectives are based on aerial index counts which do not represent total escapement, but do reflect annual spawner abundance trends when made using standard survey methods under acceptable survey conditions.

Appendix D.2

Historical age composition percentage, chinook salmon, Goodnews Bay commercial catch and escapement 1982 - 1989.

Age Composition		Total years of life at maturity ^a					Total
		3	4	5	6	7+	
1982							
Commercial	Sample Size						
Male		0.0	5.6	37.4	11.2	0.0	54.2
Female		0.0	2.8	29.9	13.1	0.0	45.8
Combined	107	0.0	8.4	67.3	24.3	0.0	100.0
Commercial Catch ^b		0	796	6,377	2,303	0	9,476
Escapement samples were not collected.							
1983							
Commercial							
Male		0.0	14.4	7.6	25.3	1.1	48.4
Female		0.0	0.2	0.6	48.8	2.0	51.6
Combined	655	0.0	14.6	8.2	74.1	3.1	100.0
Commercial Catch ^b		0	2,061	1,158	10,461	438	14,117
Escapement							
Male		0.0	0.0	9.4	39.5	2.9	51.8
Female		0.0	0.0	2.2	44.6	1.4	48.2
Combined	139	0.0	0.0	11.6	84.1	4.3	100.0
Escapement ^c		0	0	1,670	12,109	619	14,398
1984							
Commercial							
Male		0.2	7.6	32.4	22.4	5.4	68.0
Female		0.0	0.0	2.8	22.0	7.2	32.0
Combined	500	0.2	7.6	35.2	44.4	12.6	100.0
Commercial Catch ^b		17	655	3,031	3,824	1,085	8,612
Escapement							
Male		0.0	4.5	22.6	20.7	3.6	51.4
Female		0.0	0.0	4.5	39.6	4.5	48.6
Combined	111	0.0	4.5	27.1	60.3	8.1	100.0
Escapement ^c		0	393	2,369	5,272	709	8,743
1985							
Commercial							
Male		0.2	18.2	7.5	30.8	2.4	59.1
Female		0.0	10.0	4.5	25.2	1.1	40.9
Combined	532	0.2	28.2	12.0	56.0	3.6	100.0
Commercial Catch ^b		12	1,634	695	3,244	208	5,793
Escapement							
Male		0.0	0.0	0.0	21.0	5.3	59.1
Female		0.0	0.0	0.0	73.7	0.0	40.9
Combined	19	0.0	0.0	0.0	94.7	5.3	100.0
Escapement ^c		0	0	0	7,556	423	7,979

-continued-

Age Composition		Total years of life at maturity ^a					Total
		3	4	5	6	7+	
1986							
Commercial	Sample Size						
Male		0.0	17.0	49.0	16.0	4.0	86.0
Female		0.0	0.0	2.0	19.0	8.0	29.0
Combined	363	0.0	17.0	51.0	35.0	12.0	115.0
Commercial Catch ^b		0	463	1,389	953	327	2,723
1987							
Commercial							
Male		0	12.9	19.2	15.5	0	47.6
Female		0	3.0	12.3	34.3	2.6	52.4
Combined	271	0	15.9	31.7	49.8	2.6	100.0
Commercial Catch ^b		0	533	1,065	1,672	87	3,357
Escapement							
Male		0	12.8	7.7	25.6	0	46.2
Female		0	5.1	17.9	23.1	7.7	53.8
Combined	39	0	17.9	25.6	48.7	7.7	100.0
Escapement ^c		0	406	581	1,106	175	2,272
1988							
Commercial							
Male		0	18.7	16.2	15.2	2.5	52.6
Female		0	8.0	8.4	27.6	3.4	47.4
Combined	475	0	26.7	24.6	42.7	5.9	100.0
Commercial Catch ^b		1,327	1,223	2,121	293	0	4,964
Escapement							
Male		0	2.1	12.8	35.1	8.5	58.5
Female		0	0	10.6	22.3	8.5	41.5
Combined	94	0	2.1	23.4	57.4	17.0	100.0
Escapement ^c		0	114	1,268	3,110	921	5,419
1989							
Commercial							
Male		0	7.2	24.4	24.4	2.0	58.0
Female		0	2.4	15.2	22.0	2.4	42.0
Combined	250	0	9.6	39.6	46.4	4.4	100.0
Commercial Catch ^b		0	285	1,175	1,376	131	2,966
Escapement							
Male		6.3	0	15.6	28.1	3.1	53.1
Female		0	0	6.3	34.4	6.3	46.9
Combined		6.3	0	21.9	62.5	9.4	100.0
Escapement ^c		182	0	633	1,806	271	2,891

^a Total years of life is total number of years spent in fresh water and marine.

^b Allocations by age class based on commercial catch samples.

^c Age class is based on escapement samples. Escapement estimate based on the

^d Preliminary data.

Goodnews River Project.

Appendix D.3

Historical estimated run size and commercial exploitation rate, Goodnews River, 1981-1990.

Year	Species	Middle Fork Tower Estimate	Middle Fork Aerial Survey Count as a Percentage of Tower Estimate	Goodnews River Escapement Estimate	Goodnews Bay Subsistence Harvest Estimate	Goodnews Bay Commercial Harvest	Goodnews Bay Total Run Size Estimate	Exploitation ^a Percentage of Run Size
1981 ^b	Chinook	3,688	-	-	1,409	7,190	-	-
	Sockeye	49,108	-	-	3,511 ^c	40,273	-	-
	Chum	21,827	-	-	-	13,642	-	-
1982 ^b	Chinook	1,395	-	-	1,236	9,476	-	-
	Sockeye	56,255	-	-	2,754 ^c	38,877	-	-
	Chum	6,767	-	-	-	13,829	-	-
1983	Chinook	6,027	36%	16,741	1,066	14,117	31,924	47%
	Sockeye	25,816	22%	117,345	1,518 ^c	11,716	130,579	10%
	Chum	15,548	-	-	-	6,766	-	-
1984	Chinook	3,260	35%	9,314	629	8,612	18,555	49%
	Sockeye	32,053	27%	118,714	964	15,474	135,152	12%
	Chum	19,003	35%	54,294	189	14,340	68,823	21%
1985	Chinook	2,831	70%	4,044	426	5,793	10,262	39%
	Sockeye	24,131	11%	219,372	704	6,698	226,774	7%
	Chum	10,367	32%	32,396	348	4,784	37,528	13%
1986	Chinook	2,083	57%	3,654	555	2,723	6,932	47%
	Sockeye	51,069	28%	182,389	942	22,608	205,939	88%
	Chum	14,765	38%	38,855	191	10,355	49,401	21%
1987	Chinook	2,274	100%	2,274	816	3,357	6,447	64%
	Sockeye	28,871	85%	33,965	955	27,758	62,678	46%
	Chum	17,519	58%	30,205	578	20,381	51,164	40%
1988	Chinook	2,712	39%	6,953	310	4,964	12,227	43%
	Sockeye	15,799	30%	52,663	1,065	36,368	90,096	41%
	Chum	20,799	21%	99,042	448	33,059	132,549	25%
1989	Chinook	1,915	67%	2,858	467	2,966	6,291	54%
	Sockeye	21,186	60%	35,310	869	19,299	55,478	36%
	Chum	10,380	28%	37,071	760	13,622	51,453	28%
1990	Chinook	3,636	-	-	859	3,303	-	-
	Sockeye	31,679	-	-	1,045	35,823	-	-
	Chum	6,410	-	-	467	13,194	-	-

^a Commercial and subsistence exploitation^b Incomplete aerial survey results

Appendix D.4. Historical age composition percentage, sockeye salmon, Goodnews Bay commercial catch and escapement, 1982 - 1989.

Age Composition		Total years of life at maturity ^a				Total
		3	4	5	6	
1982	Sample Size					
Commercial						
Male		0.0	3.9	43.1	10.8	57.8
Female		0.0	1.0	36.3	4.9	42.2
Combined	102	0.0	4.9	79.4	15.7	100.0
Commercial Catch ^b		0	1,905	30,868	6,104	38,877
Escapement samples were not collected.						
1983						
Commercial						
Male		0.0	19.0	31.3	4.2	54.5
Female		0.0	20.0	22.3	3.2	45.5
Combined	404	0.0	39.0	53.6	7.4	100.0
Commercial Catch ^b		0	4,569	6,280	867	11,716
Escapement						
Male		0.0	72.2	11.1	0.0	83.3
Female		0.0	5.6	11.1	0.0	16.7
Combined		0.0	77.8	22.2	0.0	100.0
Escapement ^c	18	0	54,425	15,530	0	69,955
1984						
Commercial						
Male		0.0	14.8	45.1	2.2	62.1
Female		0.0	6.2	31.0	0.7	37.9
Combined	549	21.0	97.1	79.0	2.9	100.0
Commercial Catch ^b		3,250	15,025	12,224	449	15,474
Escapement						
Male		0.0	23.4	27.7	0.0	51.1
Female		0.0	21.3	27.6	0.0	48.9
Combined	47	0.0	44.7	55.3	0.0	100.0
Escapement ^c		0	30,044	37,169	0	67,213
1985						
Commercial						
Male		0.0	10.7	43.6	0.0	59.1
Female		0.0	13.5	32.2	0.0	40.9
Combined	488	0.0	24.2	75.8	0.0	100.0
Commercial Catch ^b		0	1,621	5,077	0	6,698
Escapement						
Male		0.0	17.7	47.0	0.0	64.7
Female		0.0	29.4	5.9	0.0	35.3
Combined	17	0.0	47.1	52.9	0.0	100.0
Escapement ^c		0	23,777	26,704	0	50,481

-continued-

Appendix D.4 (page 2 of 3)

Age Composition		Total years of life at maturity ^a				Total
		3	4	5	6	
1986	Sample Size					
Commercial						
Male		0.0	5.1	49.8	0.0	54.9
Female		0.0	3.5	41.6	0.0	45.1
Combined	488	0.0	8.5	91.5	0.0	100.0
Commercial Catch ^b		0	2,146	22,966	0	25,112
Escapement						
Male		0.0	5.5	54.9	0.0	60.4
Female		1.1	2.2	36.3	0.0	39.6
Combined	91	1.1	7.7	91.2	0.0	100.0
Escapement ^c		1,026	7,179	85,024	0	93,228
1987						
Commercial						
Male		0.0	4.0	45.5	0.0	49.5
Female		0.0	2.9	47.6	0.0	50.5
Combined	546	0.0	6.9	93.0	0.0	100.0
Commercial Catch ^b		0	1,932	25,826	0	27,758
Escapement						
Male		0.0	4.0	46.6	2.4	53.0
Female		0.0	6.1	39.3	1.6	47.0
Combined	578	0.0	10.1	85.9	4.0	100.0
Escapement ^c		0	2,915	24,800	1,154	28,871
1988						
Commercial						
Male		0.1	3.5	51.8	3.0	58.5
Female		0.0	0.7	37.9	2.9	41.5
Combined	738	0.1	4.2	89.7	5.9	100.0
Commercial Catch ^b		36	1,527	32,623	2,146	36,368
Escapement						
Male		0.0	5.1	36.0	1.0	42.1
Female		0.0	8.0	48.0	1.9	57.9
Combined	315	0.0	13.1	84.0	2.9	100.0
Escapement ^c		0	5,019	32,188	1,112	38,319

-continued-

Appendix D.4. (page 3 of 3)

Age Composition		<u>Total years of life at maturity^a</u>					Total
		3	4	5	6	7	
1989 ^d	Sample Size						
Commercial							
Male		.2	6.6	46.8	1.8	0	55.3
Female		0	3.8	38.5	2.1	0	44.6
Combined	579	.2	10.4	85.7	3.9	0	100.0
Commercial Catch		33	2,000	16,532	734	0	19,299
Escapement							
Male		0	0	53.9	10.3	0	64.1
Female		0	0	30.8	5.1	0	35.9
Combined		0	0	84.7	15.4	0	100.0
Escapement	39	0	0	30,048	5,463	0	35,476

^a Age classes are a total of fresh water and marine growth.

^b Age classes based on commercial catch samples.

^c Age classes based on escapement samples. Escapement estimate based on the Goodnews River counting tower.

^d Preliminary data.

Appendix D.5 Goodnews Bay District commercial salmon harvest,
1968 - 1990.

<u>YEAR</u>	<u>CHINOOK</u>	<u>SOCKEYE</u>	<u>COHO</u>	<u>PINK</u>	<u>CHUM</u>	<u>TOTAL</u>
1968			5,458			5,458
1969	3,978	6,256	11,631	298	5,006	27,169
1970	7,163	7,144	6,794	12,183	12,346	45,630
1971	477	330	1,771	0	301	2,879
1972	264	924	925	66	1,331	3,510
1973	3,543	2,072	5,017	324	15,781	26,737
1974	3,302	9,357	21,340	16,373	8,942	59,314
1975	2,156	9,098	17,889	419	5,904	35,466
1976	4,417	5,575	9,852	8,453	10,354	38,651
1977	3,336	3,723	13,335	29	6,531	26,954
1978	5,218	5,412	13,764	9,103	8,590	42,087
1979	3,204	19,581	42,098	201	9,298	74,382
1980	2,331	28,632	43,256	7,832	11,748	93,799
1981	7,190	40,273	19,749	11	13,642	80,865
1982	9,476	38,877	46,683	4,673	13,829	113,538
1983	14,117	11,716	19,660	0	6,766	52,259
1984	8,612	15,474	71,176	4,711	14,340	114,313
1985	5,793	6,698	16,498	8	4,784	33,781
1986	2,723	25,112	19,378	4,447	10,355	62,015
1987	3,357	27,758	29,057	54	20,381	80,607
1988	4,964	36,368	30,832	5,509	33,059	110,732
1989	2,966	19,299	31,849	82	13,622	67,818
1990 ^a	3,303	35,823	7,804	629	13,194	60,753
Ten year Average (1980-1989)	6,153	25,021	32,814	5,560 ^b	16,584	80,289

^a Preliminary catch numbers.

^b Even years only.

Appendix D.6 Average cumulative estimated escapement and proportion by day for chinook, sockeye and chum salmon, Goodnews River counting tower, 1981-1990.^a

Date	Chinook		Sockeye		Chum	
	<u>Avg. Cumulative</u>		<u>Avg. Cumulative</u>		<u>Avg. Cumulative</u>	
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
6/11	0	0.0001	0	0.0000	0	0.0000
6/12	0	0.0001	0	0.0000	0	0.0000
6/13	0	0.0001	0	0.0000	0	0.0000
6/14	0	0.0000	0	0.0000	0	0.0000
6/15	0	0.0000	10	0.0003	0	0.0000
6/16	0	0.0000	11	0.0003	0	0.0000
6/17	1	0.0003	14	0.0004	0	0.0000
6/18	1	0.0003	22	0.0007	0	0.0000
6/19	3	0.0009	53	0.0017	0	0.0000
6/20	6	0.0019	75	0.0024	0	0.0000
6/21	14	0.0044	157	0.0050	1	0.0000
6/22	18	0.0058	269	0.0085	3	0.0002
6/23	36	0.0118	554	0.0175	4	0.0003
6/24	56	0.0183	1061	0.0335	18	0.0012
6/25	96	0.0310	1840	0.0581	82	0.0054
6/26	137	0.0443	2554	0.0807	150	0.0098
6/27	209	0.0678	3873	0.1224	270	0.0177
6/28	267	0.0866	4836	0.1528	327	0.0214
6/29	330	0.1072	5794	0.1830	412	0.0270
6/30	409	0.1328	6690	0.2113	544	0.0356
7/1	512	0.1662	7867	0.2485	785	0.0514
7/2	594	0.1929	9091	0.2872	978	0.0640
7/3	670	0.2173	10161	0.3210	1219	0.0798
7/4	760	0.2465	11585	0.3660	1522	0.0996
7/5	876	0.2843	13387	0.4229	1868	0.1223
7/6	966	0.3134	14933	0.4717	2158	0.1413
7/7	1096	0.3557	16468	0.5202	2472	0.1618
7/8	1190	0.3861	18103	0.5719	2783	0.1822
7/9	1291	0.4190	19901	0.6287	3321	0.2174
7/10	1417	0.4598	21392	0.6759	3975	0.2602
7/11	1560	0.5060	22931	0.7245	4645	0.3041
7/12	1685	0.5466	24184	0.7640	5393	0.3531
7/13	1805	0.5856	25279	0.7986	6044	0.3956
7/14	1924	0.6243	26263	0.8297	6705	0.4389
7/15	2051	0.6655	27160	0.8581	7504	0.4912
7/16	2168	0.7035	27978	0.8839	8435	0.5522
7/17	2290	0.7432	28591	0.9033	9233	0.6044
7/18	2392	0.7763	29198	0.9225	9874	0.6464
7/19	2476	0.8034	29710	0.9386	10341	0.6770
7/20	2554	0.8286	30188	0.9538	10927	0.7153
7/21	2628	0.8528	30546	0.9650	11474	0.7511
7/22	2709	0.8790	30844	0.9745	12106	0.7925
7/23	2781	0.9025	31035	0.9805	12718	0.8325
7/24	2849	0.9246	31200	0.9857	13199	0.8640

-Continued-

Appendix D.6 (page 2 of 2)

Date	Chinook		Sockeye		Chum	
	<u>Avg. Number</u>	<u>Cumulative Percent</u>	<u>Avg. Number</u>	<u>Cumulative Percent</u>	<u>Avg. Number</u>	<u>Cumulative Percent</u>
7/25	2587	0.8396	28160	0.8897	12102	0.7922
7/26	2636	0.8552	28239	0.8922	12498	0.8181
7/27	2662	0.8639	28309	0.8944	12793	0.8375
7/28	2688	0.8724	28364	0.8961	13169	0.8621
7/29	2712	0.8802	28401	0.8973	13368	0.8751
7/30	2734	0.8871	28434	0.8983	13499	0.8837
7/31	2745	0.8909	28452	0.8989	13595	0.8900
8/1	3060	0.9930	31627	0.9992	15156	0.9921
8/2	3065	0.9946	31637	0.9995	15194	0.9946
8/3	3071	0.9966	31645	0.9998	15237	0.9975
8/4	3074	0.9976	31649	0.9999	15245	0.9979
8/5	3077	0.9986	31651	1.0000	15253	0.9985
8/6	3079	0.9991	31652	1.0000	15258	0.9988
8/7	3080	0.9995	31652	1.0000	15261	0.9990
8/8	3081	0.9998	31652	1.0000	15263	0.9992
8/9	3082	1.0000	31652	1.0000	15266	0.9994
8/10	3082	1.0000	31652	1.0000	15268	0.9994
8/11	3082	1.0000	31652	1.0000	15270	0.9996
8/12	3082	1.0000	31652	1.0000	15271	0.9997
8/13	3082	1.0000	31652	1.0000	15273	0.9998
8/14	3082	1.0000	31652	1.0000	15273	0.9998
8/15	3082	1.0000	31652	1.0000	15276	1.0000

* Average for the years 1981-1985, 1987-1990. Early termination date of project in 1986 precluded assessment of the entire chinook, sockeye and chum salmon migration. The project's normal termination date precludes adequate assessment of coho and pink salmon escapement.

Appendix D.7

Historical age composition percentage, chum salmon, Goodnews Bay commercial catch and escapement, 1982 - 1989.

Age Composition		Total years of life at maturity ^a				Total
		3	4	5	6	
1982						
Commercial	Sample Size					
Male		0.0	16.3	20.0	0.0	36.3
Female		0.7	29.6	32.7	0.7	63.7
Combined	135	0.7	45.9	52.7	0.7	100.0
Commercial Catch ^b		97	6,348	7,288	97	13,829
Escapement samples were not collected.						
1983						
Commercial						
Male		0.9	15.3	22.7	0.5	39.4
Female		2.8	27.3	30.5	0.0	60.6
Combined	216	3.7	42.6	53.2	0.5	100.0
Commercial Catch ^b		250	2,882	3,600	34	6,766
Escapement						
Male		0.6	19.0	37.3	0.0	56.9
Female		0.6	15.5	27.0	0.0	43.1
Combined	174	1.2	34.5	64.3	0.0	100.0
Escapement ^c		186	5,364	9,997	0	15,548
1984						
Commercial						
Male		0.0	30.6	15.3	2.0	47.9
Female		0.4	38.5	12.5	0.7	52.1
Combined	457	69.5	96.9	30.5	2.7	100.0
Commercial Catch ^b		9,966	13,895	4,374	387	14,340
Escapement						
Male		0.0	32.3	4.4	0.0	36.7
Female		0.0	56.6	6.7	0.0	63.3
Combined	90	0.0	88.9	11.1	0.0	100.0
Escapement ^c		0	104,670	13,069	0	117,739
1985						
Commercial						
Male		0.0	27.8	14.4	0.0	59.1
Female		0.0	30.0	27.5	0.0	40.9
Combined	270	0.0	57.8	41.9	0.0	100.0
Commercial Catch ^b		0	2,765	2,004	0	4,784
Escapement						
Male		0.0	30.4	19.6	0.0	50.0
Female		0.0	28.3	21.7	0.0	50.0
Combined	46	0.0	58.7	41.3	0.0	100.0
Escapement ^c		0	14,690	10,335	0	25,025

-continued-

Age Composition		3	Total years of life at maturity ^a			Total
			4	5	6	
1986						
Commercial	Sample Size					
Male		0.2	37.7	12.2	0.2	50.3
Female		0.5	36.0	12.5	0.7	49.7
Combined	353	0.7	73.7	24.7	0.9	100.0
Commercial Catch ^b		72	7,632	2,558	93	10,355
Escapement						
Male		0.0	38.0	19.0	0.0	57.0
Female		0.0	33.0	10.0	0.0	43.0
Combined	21	0.0	71.0	29.0	0.0	100.0
Escapement ^c		0	36,856	15,054	0	51,910
1987						
Commercial						
Male		0	37.2	17.9	0	55.1
Female		0	28.6	16.3	0	44.9
Combined	430	0	65.8	34.2	0	100.0
Commercial Catch ^b		0	13,414	6,967	0	20,381
Escapement						
Male		0.0	37.3	30.2	0.0	67.5
Female		0.2	22.3	10.1	0.0	32.5
Combined	467	0.2	59.5	40.3	0.0	100.0
Escapement ^c		81	22,503	15,218	0	37,802
1988						
Commercial						
Male		.6	9.4	33.9	1.1	45.0
Female		.2	13.6	40.7	0.4	55.0
Combined	469	.9	23.0	74.6	1.5	100.0
Commercial Catch ^b		282	7,613	24,671	493	33,059
Escapement						
Male		0.7	12.5	35.1	1.2	49.5
Female		0.0	16.4	32.1	0.9	49.5
Combined	422	0.7	28.9	67.2	2.1	100.0
Escapement ^c		276	11,416	26,544	830	39,501

-continued-

Age Composition		<u>Total years of life at maturity^a</u>				
		3	4	5	6	Total
1989 ^d	Sample Size					
Commercial						
Male		0.2	27.0	27.2	1.3	55.7
Female		0.2	20.9	22.6	0.6	44.3
Combined	540	0.4	48.0	49.8	1.9	100.0
Commercial Catch ^b		50	6,534	6,786	252	13,622
Escapement						
Male		1.0	50.0	22.5	0	73.5
Female		0.0	19.6	6.9	0	26.5
Combined		1.0	69.6	29.4	0	100.0
Escapement ^c		150	10,681	4,664	0	15,495

^a Age classes are a total of fresh water and marine growth.

^b Age classes based on commercial catch samples.

^c Age classes based on escapement samples. Escapement estimate based on the Goodnews River counting tower.

^d Preliminary data.

Appendix D.8 Summary of historical commercial harvest by period
Goodnews Bay District, chinook salmon, 1981-1990.

<u>DATE</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
6/12	0	0	0	0	0.00000
6/13	1	1252	1252	1252	0.00887
6/14	0	0	0	0	0.00887
6/15	1	197	197	197	0.01161
6/16	2	251	1096	674	0.02443
6/17	1	362	362	362	0.02825
6/18	3	387	1706	1084	0.07569
6/19	2	296	390	343	0.09971
6/20	4	358	2642	1013	0.14859
6/21	2	1298	1535	1417	0.17986
6/22	1	1591	1591	1591	0.20199
6/23	3	583	1639	1003	0.28360
6/24	3	476	988	695	0.32138
6/25	3	340	1896	1286	0.37623
6/26	2	352	416	384	0.40319
6/27	2	1627	3944	2786	0.45921
6/28	3	807	1307	1024	0.50503
6/29	2	330	457	394	0.52138
6/30	3	460	1551	979	0.58087
7/1	1	1156	1156	1156	0.60082
7/2	4	234	710	463	0.63832
7/3	2	156	391	274	0.65523
7/4	1	2301	2301	2301	0.67153
7/5	5	95	1809	656	0.72417
7/6	1	272	272	272	0.72795
7/7	6	196	1119	641	0.80888
7/8	3	147	495	277	0.82303
7/9	3	135	351	278	0.83485
7/10	3	156	203	186	0.85019
7/11	5	63	408	222	0.87002
7/12	2	327	737	532	0.88159
7/13	2	66	135	101	0.88547
7/14	5	54	514	231	0.90380
7/15	3	77	354	204	0.91473
7/16	4	54	294	123	0.92330
7/17	1	210	210	210	0.92623
7/18	4	54	217	100	0.93296
7/19	1	66	66	66	0.93366
7/20	4	75	192	124	0.94268
7/21	3	35	68	49	0.94617
7/22	2	80	228	154	0.94890

-continued-

Appendix D.8 (page 2 of 3)

<u>DATE</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
7/23	4	17	97	48	0.95275
7/24	2	23	77	50	0.95460
7/25	5	0	82	35	0.95825
7/26	1	0	0	0	0.95825
7/27	5	24	122	64	0.96256
7/28	2	5	21	13	0.96338
7/29	3	31	157	73	0.96557
7/30	4	16	73	36	0.96826
7/31	2	20	34	27	0.96941
8/1	6	12	78	37	0.97254
8/2	2	19	26	23	0.97362
8/3	6	9	102	47	0.97725
8/4	3	6	17	12	0.97817
8/5	4	12	54	27	0.97945
8/6	4	6	79	27	0.98114
8/7	2	15	43	29	0.98225
8/8	6	0	60	17	0.98405
8/9	2	11	18	15	0.98477
8/10	6	5	78	28	0.98676
8/11	3	5	15	10	0.98765
8/12	4	7	47	25	0.98883
8/13	5	0	36	12	0.99000
8/14	3	8	41	20	0.99107
8/15	4	5	26	15	0.99188
8/16	4	0	12	5	0.99232
8/17	5	2	22	12	0.99323
8/18	3	0	8	5	0.99379
8/19	4	5	14	10	0.99448
8/20	4	1	12	7	0.99506
8/21	4	0	7	4	0.99544
8/22	4	3	17	10	0.99598
8/23	3	0	7	4	0.99632
8/24	4	2	17	9	0.99697
8/25	4	0	13	5	0.99724
8/26	4	2	8	5	0.99766
8/27	4	2	13	6	0.99803
8/28	4	1	8	4	0.99846
8/29	5	2	4	3	0.99881
8/30	3	1	4	2	0.99899
8/31	4	1	6	3	0.99921

-continued-

Appendix D.8 (page 3 of 3)

<u>DATE</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
9/1	4	0	7	2	0.99950
9/2	4	1	5	3	0.99973
9/3	3	0	2	1	0.99975
9/4	3	0	6	2	0.99987
9/5	4	0	5	2	0.99997
9/6	2	0	0	0	0.99997
9/7	5	0	1	0	0.99999
9/8	4	0	2	1	0.99999
9/9	1	0	0	0	1.00000

Appendix D.9 Summary of historical commercial harvest by period
 Goodnews Bay District, sockeye salmon, 1981-1990.

<u>DATE</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
6/12	0	0	0	0	0.00000
6/13	1	27	27	27	0.00023
6/14	0	0	0	0	0.00023
6/15	1	70	70	70	0.00040
6/16	2	125	696	411	0.00338
6/17	1	744	744	744	0.00533
6/18	3	281	596	408	0.01042
6/19	2	478	551	515	0.01518
6/20	4	102	1989	752	0.02781
6/21	2	967	1280	1124	0.03739
6/22	1	569	569	569	0.03881
6/23	3	1029	2701	1732	0.05793
6/24	3	596	2120	1536	0.07917
6/25	3	1040	2087	1594	0.09986
6/26	2	1719	1909	1814	0.11660
6/27	2	685	952	819	0.13495
6/28	3	2097	3371	2800	0.16536
6/29	2	1422	3323	2373	0.17817
6/30	3	2037	8143	5091	0.22831
7/1	1	1143	1143	1143	0.24538
7/2	4	1818	8198	3695	0.29371
7/3	2	2589	5510	4050	0.32697
7/4	1	1598	1598	1598	0.34061
7/5	5	1254	4221	2582	0.38629
7/6	1	2346	2346	2346	0.39211
7/7	6	2057	4833	3448	0.47444
7/8	3	1231	3600	2320	0.50800
7/9	3	2167	3751	3020	0.54056
7/10	3	1759	4494	3157	0.57556
7/11	5	1397	3826	2511	0.64098
7/12	2	1444	2318	1881	0.65636
7/13	2	2046	2720	2383	0.66882
7/14	5	1039	3173	2277	0.71356
7/15	3	1229	4818	2942	0.75389
7/16	4	902	2841	1774	0.78015
7/17	1	3936	3936	3936	0.78992
7/18	4	559	3049	1675	0.81385
7/19	1	1683	1683	1683	0.81824
7/20	4	395	3852	1840	0.84040
7/21	3	507	1318	904	0.85157
7/22	2	614	2207	1411	0.86229

-continued-

Appendix D.9 (page 2 of 3)

<u>DATE</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
7/23	4	162	874	546	0.87056
7/24	2	588	2458	1523	0.87971
7/25	5	0	1534	518	0.88800
7/26	1	0	0	0	0.88800
7/27	5	166	1270	538	0.89877
7/28	2	278	555	417	0.90171
7/29	3	630	1312	1045	0.91366
7/30	4	84	423	299	0.91764
7/31	2	300	803	552	0.92119
8/1	6	45	811	355	0.93193
8/2	2	256	335	296	0.93413
8/3	6	36	949	490	0.94493
8/4	3	188	208	195	0.94725
8/5	4	94	932	440	0.95418
8/6	4	34	498	240	0.95715
8/7	2	178	686	432	0.95977
8/8	6	0	926	259	0.96456
8/9	2	46	135	91	0.96538
8/10	6	18	659	326	0.97188
8/11	3	0	174	85	0.97299
8/12	4	17	564	238	0.97650
8/13	5	0	204	106	0.97833
8/14	3	4	316	147	0.97981
8/15	4	5	398	137	0.98167
8/16	4	0	110	35	0.98238
8/17	5	4	498	179	0.98500
8/18	3	0	120	72	0.98597
8/19	4	5	360	125	0.98768
8/20	4	0	138	60	0.98852
8/21	4	1	239	104	0.99031
8/22	4	7	353	120	0.99187
8/23	3	0	88	31	0.99239
8/24	4	1	244	90	0.99342
8/25	4	0	90	37	0.99423
8/26	4	0	204	88	0.99525
8/27	4	0	148	44	0.99577
8/28	4	1	79	48	0.99655
8/29	5	1	155	54	0.99737
8/30	3	0	68	24	0.99779
8/31	4	0	88	44	0.99833

-continued-

Appendix D.9 (page 3 of 3)

<u>DATE</u>	No. Years w/ fishing period on this date	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
9/1	4	0	57	26	0.99883
9/2	4	2	69	41	0.99935
9/3	3	0	21	7	0.99944
9/4	3	0	53	18	0.99964
9/5	4	0	61	15	0.99981
9/6	2	0	0	0	0.99981
9/7	5	0	63	14	1.00000
9/8	4	0	0	0	1.00000
9/9	1	0	0	0	1.00000

Appendix D.10 Summary of historical commercial harvest by period
Goodnews Bay District, chum salmon, 1981-1990.

<u>DATE</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
6/12	0	0	0	0	0.00000
6/13	1	10	10	10	0.00015
6/14	1	0	0	0	0.00015
6/15	1	102	102	102	0.00090
6/16	2	89	1091	590	0.00551
6/17	1	167	167	167	0.00672
6/18	3	194	501	316	0.01288
6/19	2	249	557	403	0.01937
6/20	4	165	3501	1110	0.04173
6/21	2	591	698	645	0.05090
6/22	1	708	708	708	0.05609
6/23	3	886	7833	3202	0.09484
6/24	3	594	1188	868	0.12213
6/25	3	724	2351	1472	0.15399
6/26	2	866	1241	1054	0.17147
6/27	2	691	728	710	0.19666
6/28	3	649	8369	3666	0.24048
6/29	2	425	1235	830	0.25296
6/30	3	1349	2048	1675	0.28468
7/1	1	710	710	710	0.29952
7/2	4	713	3434	2067	0.34522
7/3	2	1309	3074	2192	0.36991
7/4	1	1626	1626	1626	0.39392
7/5	5	976	3193	1777	0.44475
7/6	1	963	963	963	0.45181
7/7	6	1357	4478	2210	0.55347
7/8	3	949	1894	1392	0.58880
7/9	3	1191	1371	1306	0.61726
7/10	3	1346	2085	1677	0.65730
7/11	5	562	5830	1884	0.71899
7/12	2	1057	1384	1221	0.73636
7/13	2	896	1143	1020	0.75153
7/14	5	601	2123	1340	0.80287
7/15	3	767	2495	1735	0.84673
7/16	4	476	1360	919	0.87650
7/17	1	1532	1532	1532	0.88773
7/18	4	488	1191	722	0.91263
7/19	1	506	506	506	0.91629
7/20	4	479	1265	833	0.93754
7/21	3	233	467	380	0.94697
7/22	2	307	362	335	0.95456

-continued-

Appendix D.10 (page 2 of 3)

<u>DATE</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
7/23	4	35	301	192	0.96083
7/24	2	244	315	280	0.96493
7/25	5	0	236	151	0.96998
7/26	1	0	0	0	0.96998
7/27	5	58	166	126	0.97546
7/28	2	89	93	91	0.97699
7/29	3	32	166	90	0.97990
7/30	4	42	124	94	0.98285
7/31	2	8	92	50	0.98358
8/1	6	22	61	49	0.98663
8/2	2	47	92	70	0.98764
8/3	6	22	105	50	0.98981
8/4	3	23	36	29	0.99050
8/5	4	21	63	32	0.99165
8/6	4	22	41	31	0.99259
8/7	2	16	21	19	0.99286
8/8	6	0	26	15	0.99346
8/9	2	19	45	32	0.99393
8/10	6	8	36	20	0.99476
8/11	3	10	25	16	0.99513
8/12	4	0	16	8	0.99542
8/13	5	2	22	10	0.99575
8/14	3	9	62	27	0.99648
8/15	4	0	10	5	0.99663
8/16	4	0	14	5	0.99684
8/17	5	6	22	10	0.99718
8/18	3	0	6	3	0.99726
8/19	4	2	16	7	0.99744
8/20	4	0	11	5	0.99761
8/21	4	0	127	35	0.99861
8/22	4	3	6	5	0.99875
8/23	3	0	6	2	0.99880
8/24	4	0	8	4	0.99886
8/25	4	0	4	2	0.99895
8/26	4	0	42	13	0.99926
8/27	4	0	5	2	0.99933
8/28	4	0	11	4	0.99944
8/29	5	0	6	3	0.99955
8/30	3	0	2	1	0.99959
8/31	4	0	4	2	0.99967

Appendix D.10 (page 3 of 3)

<u>DATE</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
9/1	4	0	4	2	0.99971
9/2	4	0	10	4	0.99983
9/3	3	0	4	2	0.99988
9/4	3	0	9	4	0.99996
9/5	4	0	3	1	0.99998
9/6	2	0	0	0	0.99998
9/7	5	0	2	1	1.00000
9/8	4	0	0	0	1.00000
9/9	1	0	0	0	1.00000

Appendix D.11 Summary of historical commercial harvest by period,
Goodnews Bay, coho salmon, 1979-1990.

<u>DATE</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
7/14	1	1	1	1	0.00000
7/15	0	0	0	0	0.00000
7/16	2	2	18	10	0.00004
7/17	0	0	0	0	0.00004
7/18	1	5	5	5	0.00006
7/19	1	6	6	6	0.00007
7/20	2	1	111	56	0.00022
7/21	4	1	18	7	0.00029
7/22	0	0	0	0	0.00029
7/23	3	13	195	79	0.00070
7/24	2	14	33	24	0.00083
7/25	3	24	383	162	0.00176
7/26	1	40	40	40	0.00185
7/27	3	7	1059	378	0.00343
7/28	3	36	153	86	0.00412
7/29	4	5	91	33	0.00451
7/30	3	209	1306	584	0.00762
7/31	4	36	364	122	0.00901
8/1	6	56	2811	603	0.01607
8/2	3	203	1148	747	0.02128
8/3	5	66	3943	883	0.02802
8/4	5	92	949	568	0.03596
8/5	4	126	752	396	0.04247
8/6	5	314	4275	1673	0.05874
8/7	2	231	812	522	0.06213
8/8	6	547	2712	1425	0.08392
8/9	2	2163	2240	2202	0.09445
8/10	6	858	4198	1751	0.11989
8/11	4	663	6065	2618	0.14597
8/12	4	1255	2074	1680	0.17516
8/13	6	1102	4852	2360	0.20623
8/14	3	1325	2374	2018	0.23115
8/15	6	1225	5999	3225	0.27682
8/16	3	1667	5456	3227	0.30393
8/17	6	1390	6880	3487	0.35657
8/18	4	1446	3864	2647	0.38822
8/19	4	1394	4180	2886	0.43075
8/20	5	68	9590	3761	0.46889
8/21	4	968	3459	1965	0.49755
8/22	6	1723	6731	3368	0.55053
8/23	4	1308	5306	3203	0.58366
8/24	5	1597	4356	3101	0.62362
8/25	5	1739	3709	2957	0.66796

-continued-

<u>DATE</u>	No. Years w/ fishing period on <u>this date</u>	<u>Minimum</u> <u>harvest</u>	<u>Maximum</u> <u>harvest</u>	<u>Average</u> <u>harvest</u>	<u>Cumulative</u> <u>proportion</u> <u>harvest</u>
8/26	4	1918	3249	2517	0.70661
8/27	5	1101	6625	3315	0.74165
8/28	4	1377	3529	2259	0.77585
8/29	6	725	4972	2460	0.81093
8/30	4	1483	3926	2734	0.84058
8/31	5	1125	3479	2410	0.87239
9/1	5	604	2778	1798	0.89783
9/2	4	653	3233	1541	0.92071
9/3	5	377	3822	2007	0.94147
9/4	3	374	2685	1567	0.96102
9/5	6	0	2695	1447	0.98239
9/6	3	0	1715	956	0.98816
9/7	4	0	1656	690	0.99610
9/8	3	0	843	281	1.00000

APPENDIX F

Appendix F.1 Commercial freshwater fin fishery catch data, Kuskokwim Area, 1967-1990.

<u>Year</u>	<u>Number of Fishermen^b</u>	<u>Number Caught^a</u>		<u>Total Weight (lbs)</u>		<u>Total Value (\$)</u>		
		<u>Whitefish</u>	<u>Burbot</u>	<u>Whitefish</u>	<u>Burbot</u>	<u>Whitefish</u>	<u>Burbot</u>	<u>Total</u>
1967		2,817				1,817		
1968		6,182				3,080		
1969		6,393				3,196		
1970		10,337				3,049		
1971								
1972								
1973								
1974								
1975								
1976								
1977	3	718	0	c	0	952	0	952
1978	b	1,735	0	6,017	0	c	0	c
1979	b	3,219	0	11,211	0	c	0	c
1980	4	603	0	2,173	0	830	0	830
1981	4	1,197	0	4,620	0	2,310	0	2,310
1982	5	1,512	0	6,219	0	2,856	0	2,856
1983	0	0	0	0	0	0	0	0
1984	2	0	651	0	c	0	c	c
1985	5	555	1,829	2,275	2,016	1,137	455	1,593
1986	3	0	0	0	3,428	0	857	857
1987	4	417	0	1,260	0	1,008	0	1,008
1988	3	c	c	2,588	7	1,991	3	1,994
1989	7	178	282	583	270	501	597	1,098
1990	11	1664	c	5,502	10	5,166	5	5,171

a Does not include catches incidental to the commercial salmon fishery.

b Does not include fisherman who delivered catches incidental to the commercial salmon fishery.

c Data not available.

d Preliminary data.

APPENDIX G

Appendix G.1

Commercial miscellaneous saltwater finfish fishery catch
data, Kuskokwim Area, 1988-1990.

<u>Year</u>	<u>Number of Fishermen</u>	<u>Species</u>	<u>Number Caught</u>	<u>Total Weight (lbs)</u>	<u>Total Value (\$)</u>
1988	4	Tom Cod ^a	b	439	878
1989	2	Tom Cod	b	591	1,180
1990	1	Tom Cod	300	221	442

a Tom Cod is the "local" name for Saffron Cod (Eleginus gracilis).

b Data not available

APPENDIX H

Appendix H.1

Estimated biomass and commercial harvest of Pacific herring in Kuskokwim Area fishing districts, Alaska, 1981-1990.

District	Estimated	Harvest				Roe%	Estimated	Exploitation
	Biomass	Sac-roe	Bait	Waste	Total		Value	Rate
	(st)						(\$ X 1000)	(%)
1990								
Security Cove	2650	174	60	0	234	8.7	94	8.8
Goodnews Bay	2577	427	28	0	455	12.2	314	17.7
Cape Avinof	2020	49	1	0	50	12.0	35	2.5
Nelson Is.	2705	-	-	-	-	-	-	-
Munivak Is.	422	-	-	-	-	-	-	-
Total	10374	650	89	0	739	11.1	443	7.1
1989								
Security Cove	2830	544	10	0	554	9.4	256	19.6
Goodnews Bay	4044	453	162	0	616	8.4	335	15.2
Cape Avinof	689	90	39	0	129	8.0	54	18.7
Nelson Is.	3316	122	100	11	233	8.5	57	7.0
Munivak Is.	617	79	37	0	116	9.4	42	18.8
Total	11496	1289	347	11	1647	8.8	744	14.3
1988								
Security Cove	4906	324	0	0	324	9.3	362	6.6
Goodnews Bay	4479	473	10	0	483	8.0	463	10.8
Cape Avinof	4108	348	0	0	348	8.6	264	8.5
Nelson Is.	7152	760	15	0	775	9.2	713	10.8
Munivak Is.	2800	-	-	-	-	-	-	-
Total	23445	1905	25	0	1930	8.8	1802	8.2
1987								
Security Cove	2300	312	1	0	313	9.7	242	13.6
Goodnews Bay	2000	179	142	0	321	7.3	133	16.1
Nelson Is.	8100	915	8	0	923	9.2	661	11.4
Munivak Is.	4400	254	160	0	414	7.8	231	9.4
Total	16800	1660	311	0	1971	8.7	1267	11.7
1986								
Security Cove	3700	747	4	0	751	11.2	535	20.3
Goodnews Bay	3000	554	3	0	557	10.4	325	18.6
Nelson Is.	7300	852	34	0	886	10.3	428	12.1
Munivak Is.	6000	469	42	0	511	10.1	213	8.5
Total	20000	2622	83	0	2705	10.5	1501	13.5
1985								
Security Cove	4900	703	0	30	733	10.1	355	15.0
Goodnews Bay	4300	711	0	13	724	8.7	309	16.8
Nelson Is.	9500	967	10	0	977	10.6	527	10.3
Munivak Is.	5700	349	9	0	358	8.9	146	6.3
Total	24400	2730	19	43	2792	9.8	1337	11.4
1984								
Security Cove	5100	325	0	10	335	11.8	110	6.6
Goodnews Bay	4100	667	0	50	717	10.1	168	17.5
Total	9200	992	0	60	1052	10.6	278	11.4
1983								
Security Cove	6400	966	107	0	1073	9.4	443	16.8
Goodnews Bay	3200	426	9	0	435	9.4	185	13.6
Total	9600	1392	116	0	1508	9.4	628	15.7
1982								
Security Cove	5100	707	106	0	813	9.3	271	15.9
Goodnews Bay	2600	437	49	0	486	9.5	188	18.7
Total	7700	1144	155	0	1299	9.4	459	16.9
1981								
Security Cove	8300	1150	23	0	1173	8.1	347	14.1
Goodnews Bay	4300	558	99	0	657	7.7	196	15.3
Total	12600	1708	122	0	1830	8.0	543	14.5

	Year															
Village	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
<u>Nelson Island</u>																
Tununak	22	15	57	38	34	65	40	48	94	e	43	63	48	49	47	54
Umkumiut	33	9	3	11	8	3	10	0	e	e	e	e	d	d	d	d
Toksook Bay	34	35	21	37	51	29	14	35	-	-	46	70	51	59	52	46
Nightmute	-	-	-	-	-	-	-	-	-	-	3 ^b	21	15	16	15	18
Newtok	-	-	-	-	-	-	-	-	-	-	7 ^b	13	10	12	10	8
Total	89	59	81	86	93	97	64	83	94	-	99	167	124	136	124	126
No. of Fishing Families	109	42	90	83	54	70	93	65	43	-	65 ^b	72 ^b	96	104	- ^b	100
<u>Nunivak Island</u>																
Makoryuk	-	-	-	-	-	-	-	-	-	-	<1	<1	-	e	e	5
No. of Fishing Families	-	-	-	-	-	-	-	-	-	-	11	6 ^b	-	e	e	19
<u>Other Kuskokwim Delta</u>																
Cheformak	-	-	-	-	-	-	-	-	-	-	13 ^b	c	14	e	e	e
Kipnuk	-	-	-	-	-	-	-	-	-	-	9	c	14	c	e	e
Kongiganak	-	-	-	-	-	-	-	-	-	-	3	2	c	e	e	e
Kwigillingok	-	11	1	-	8	13	-	13	-	-	5	c	c	e	e	e
Total	-	11	1	-	8	13	-	13	-	-	30	2	28	e	e	e
No. of Fishing Families	-	8	9	-	22	19	-	21	-	-	55 ^b	12 ^b	49	e	e	e
<u>All Areas Combined</u>																
Total Catch	92	75	85	91	112	121	78	107	103	11	138	177	155	136	124	145
No. of Fishing Families	143	91	129	112	160	150	139	89	80	47	175 ^b	131	184	104	- ^b	119

a Subsistence survey results are believed to accurately reflect harvest trends, however, reported catches reflect minimum figures since all fishermen cannot be contacted.

b Fishing families were not interviewed or only a portion of fishing families were interviewed as catch was enumerated while on drying racks.

c Survey not allowed by village council.

d Umkumiut effort included with Toksook Bay and Nightmute.

e Not surveyed.

Appendix H.3 Number of buyers and fishermen participating in Kuskokwim
Area Pacific herring fisheries, Alaska, 1981-1989.

<u>Year</u>	<u>District</u>	<u>Number of Buyers</u>	<u>Number of Fishermen</u>	<u>Number of Deliveries</u>
<u>1990</u>	Security Cove	9	52	77
	Goodnews Bay	3	126	530
	Cape Avinof	1	101	109
	Nelson Island	No commercial opening		
	Nunivak Island	No commercial opening		
<u>1989</u>	Security Cove	8	104	108
	Goodnews Bay	6	138	533
	Cape Avinof	3	147	335
	Nelson Island	4	162	438
	Nunivak Island	3	45	210
<u>1988</u>	Security Cove	4	31	51
	Goodnews Bay	6	60	309
	Cape Avinof	1	98	485
	Nelson Island	7	174	547
	Nunivak Island	No commercial opening		
<u>1987</u>	Security Cove	8	65	67
	Goodnews Bay	4	117	191
	Nelson Island	9	235	633
	Nunivak Island	4	61	341
<u>1986</u>	Security Cove	11	88	199
	Goodnews Bay	5	104	319
	Nelson Island	4	163	1,099
	Nunivak Island	5	36	284
<u>1985</u>	Security Cove	6	107	268
	Goodnews Bay	5	83	420
	Nelson Island	6	143	776
	Nunivak Island	5	37	273
<u>1984</u>	Security Cove	4	38	86
	Goodnews Bay	4	130	390
<u>1983</u>	Security Cove	6	94	312
	Goodnews Bay	4	84	225
<u>1982</u>	Security Cove	3	107	250
	Goodnews Bay	3	84	297
<u>1981</u>	Security Cove	7	113	311
	Goodnews Bay	5	175	479

APPENDIX S

NAME

PLEASE WRITE THE NUMBER OF ALL SALMON CAUGHT EACH DAY BY PEOPLE LIVING IN YOUR HOUSE. PLEASE INCLUDE SALMON THAT WERE GIVEN TO PEOPLE WHO LIVE IN OTHER HOUSES AND SALMON THAT WERE CAUGHT FOR DOGFOOD. **DO NOT** INCLUDE SALMON SOLD WHEN COMMERCIAL FISHING.

Bulk Rate
U.S. Postage
Paid
Fairbanks, Ak.
Permit No. 69

This calendar is sent to you by the Alaska Department of Fish and Game in Bethel.

WHEN DONE SALMON FISHING FOR THE YEAR, FOLD THIS CALENDAR SO THAT THE ADDRESS ON THE BACK IS VISIBLE AND DROP IN THE MAIL. POSTAGE IS NOT NEEDED.


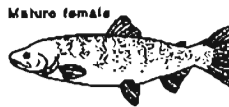
JUNE 1990

SUBSISTENCE SALMON CALENDAR

WHAT DATE DID YOU START SUBSISTENCE SALMON FISHING THIS YEAR? _____ PLEASE WRITE HERE THE TOTAL NUMBER OF SALMON CAUGHT IN MAY . KING _____ CHUM _____ RED _____					FRIDAY	SATURDAY
					1	2
					KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY		
3	4	5	6	7	8	9
TARYAOVAK = KING _____ IQALLUK = CHUM _____ SAYAK = RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____
10	11	12	13	14	15	16
KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____
17	18	19	20	21	22	23
KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____
24	25	26	27	28	29	30
KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____

JULY 1990

SUBSISTENCE SALMON CALENDAR

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1	2	3	4	5	6	7
KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____
8	9	10	11	12	13	14
TARYAOVAK = KING _____ IQALLUK = CHUM _____ SAYAK = RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____
15	16	17	18	19	20	21
KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____
22	23	24	25	26	27	28
TARYAOVAK = KING _____ IQALLUK = CHUM _____ SAYAK = RED _____ QAKDYAO = SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____
29	30	31	<div> <div>Breeding male</div>  <div>Mature female</div>  <div>Common name: Chum salmon</div> </div>			
KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____				

NAME _____

This calendar is sent to you by the
Alaska Department of Fish and Game
in Bethel.



PLEASE WRITE THE NUMBER OF ALL SALMON
CAUGHT EACH DAY BY PEOPLE LIVING IN YOUR
HOUSE. PLEASE INCLUDE SALMON THAT WERE
GIVEN TO PEOPLE WHO LIVE IN OTHER HOUSES
AND SALMON THAT WERE CAUGHT FOR DOGFOOD.
DO NOT INCLUDE SALMON SOLD WHEN COMMERCIAL
FISHING.

WHEN DONE SALMON FISHING FOR THE YEAR, FOLD
THIS CALENDAR SO THAT THE ADDRESS ON THE
BACK IS VISIBLE AND DROP IN THE MAIL. POSTAGE
IS NOT NEEDED.


Bulk Rate
U.S. Postage
Paid
Fairbanks, Ak.
Permit No. 59

AUGUST 1990

SUBSISTENCE SALMON CALENDAR

 Breeding male Common Name: Silver Salmon			WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
			1	2	3	4
			KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____
SUNDAY	MONDAY	TUESDAY				
5	6	7	8	9	10	11
TARYAOVAK = KING _____ IOALLUK = CHUM _____ SAYAK = RED _____ OAKHYAO = SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____
12	13	14	15	16	17	18
KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____
19	20	21	22	23	24	25
IOALLUK = CHUM _____ SAYAK = RED _____ OAKHYAO = SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____
26	27	28	29	30	31	
CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	

SEPTEMBER 1990 SUBSISTENCE SALMON CALENDAR

						SATURDAY
						1
						CHUM _____ RED _____ SILVER _____
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	
2	3	4	5	6	7	8
IOALLUK = CHUM _____ SAYAK = RED _____ OAKHYAO = SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____
9	10	11	12	13	14	15
CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____
16	17	18	19	20	21	22
CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____
23	24	25	26	27	28	29
CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____	CHUM _____ RED _____ SILVER _____
30	PLEASE WRITE HERE THE TOTAL NUMBER OF SALMON CAUGHT IN OCTOBER. CHUM _____ RED _____ SILVER _____					
CHUM _____ RED _____ SILVER _____						

Dear Kuskokwim Area Resident,

Each spring the Alaska Department of Fish and Game mails subsistence catch calendars to Kuskokwim area households that harvest salmon for subsistence use. This postcard was mailed to you as part of our effort to collect information about the harvest of Kuskokwim salmon. We would appreciate your assistance.

Please take a moment to fill out the bottom back side of this card and drop it in the mail to us. No stamp is necessary, postage is already paid. This information will be used to help make sure that there will be enough salmon for subsistence use.

Thank you,
Subsistence Division Office
Room 214, BNC Complex
Bethel (543-3100)

Division of Subsistence
Alaska Dept. of Fish and Game
P.O. Box 1788
Bethel, AK 99559

BUSINESS REPLY MAIL
First Class Mail Permit No. 50 Fairbanks, AK.

Postage Will Be Paid By Addressee

State of Alaska
Department of Fish and Game
Subsistence Division
P.O. Box 1788
Bethel, AK 99559-1788



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED
STATES



Division of Subsistence
Alaska Dept. of Fish and Game
P.O. Box 1788
Bethel, AK 99559

(correct your address if necessary)

NAME: _____
P.O. BOX: _____
CITY, STATE: _____
ZIP CODE: _____

1. Did your household harvest salmon in 1990 for subsistence use?
(include the salmon kept for subsistence when commercial fishing) Yes _____ No _____
2. How many salmon did your household harvest for subsistence?
(include those eaten, frozen, dried, smoked, canned, or used as dogfood)
Chinook _____ Chum _____ Sockeye _____ Coho _____
(Kings) (Dogs) (Reds) (Silvers)
3. What type(s) of gear did your household use to catch subsistence salmon?
Set net _____ Drift net _____ Fishwheel _____ Rod and reel _____
4. Please write comments and suggestions here: _____

Division of Subsistence; Bethel

King = "taryaqvak,"

Chum = "iqulluk,"

Sockeye = "sayak,"

Silver = "qakiiyaq"

Community _____

HHID# & Name _____

Date of Survey _____

Person Interviewed _____

Interviewer _____

Relation to HH _____

KUSKOKWIM AREA 1990 POST-SEASON SUBSISTENCE

SALMON HARVEST SURVEY

* (Questions marked with an asterisk are asked of all households interviewed)

- *1. We would like to make sure we have the correct name and address for this household.

Name of household head: _____

Mailing address: _____

- *2. Do you have a salmon harvest calendar?

Yes ____, No ____, Mailed it in ____, Didn't receive ____, Didn't use ____

- *3. Did anyone living in this house fish for subsistence salmon this year?

A. No ____: Don't usually fish ____, Usually fish ____

Did this household help another household put up salmon?

No ____ (Go to Question 6, next page)

Yes ____:

Which households did this household help (Who, Names, HHID) _____

How many salmon did this household get? (are they all on the calendar?)

KINGS _____

CHUMS _____

SOCKEYES _____

SILVERS _____

("chinook")

("dogs")

("red")

("coho")

Do you know how many salmon all of you caught? No ____

KINGS _____

CHUMS _____

SOCKEYES _____

SILVERS _____

(Go to Question 6, next page) _____

- B. Yes ____ 1. (For calendar holders) (For Non-calendar holders, see next page)

Are all of the salmon this household caught listed on the calendar?

(Ask about salmon cooked, eaten, frozen, dog food, given away)

1. Yes ____: (If calendar was not received in Bethel or is unavailable, get estimates)

Kings _____

Chums _____

Sockeyes _____

Silvers _____

Did other households fish with you?

no ____

yes ____: (Who, Names, HHID) _____

Are the salmon that were caught, for this household only?

yes ____

no ____: What other households are they for? _____

How many are for this household?

KINGS _____

CHUMS _____

SOCKEYES _____

SILVERS _____

(Go to Question 4, next page) _____

2. No ____:

How many subsistence salmon did members of this household catch?

KINGS _____

CHUMS _____

SOCKEYES _____

SILVERS _____

Did other households fish with you?

no ____

yes ____: (Who, Names, HHID) _____

Are the salmon that were caught, for this household only?

yes ____

no ____: What other households are they for? _____

How many are for this household?

KINGS _____

CHUMS _____

SOCKEYES _____

SILVERS _____

(Go to Question 4, next page) _____

II. (For Non-calendar holders)

How many subsistence salmon did members of this household catch?

(Ask about salmon cooked, eaten, frozen, dog food, given away)

KINGS _____ CHUMS _____ SOCKEYES _____ SILVERS _____

Did other households fish with you?

no _____

yes _____ : (Who, Names, HHD) _____

Are the salmon that were caught, for this household only?

yes _____ (Go to Question 4)

no _____ : **What other households are they for?** _____

How many are for this household?

KINGS _____ CHUMS _____ SOCKEYES _____ SILVERS _____

(Go to Question 4) _____

4. Did you harvest salmon for dog food?

No _____ (Go to Question 5)

Yes _____ :

How many?

CHUMS _____ SOCKEYES _____ SILVERS _____
("dogs") ("reds") ("cohos")

Are these on the calendar? Yes _____, No _____

How many dogs do you have? _____

5. What type(s) of fishing gear was used for catching subsistence salmon this year?

Drift net _____, Fish wheel _____, Seining _____, Spear _____

Set net _____, Rod-and-reel _____, Other (Identify) _____

***6. Does this household commercial fish?**

No _____ (Go to Question 7)

Yes _____ : (Where? _____ Kuskokwim _____ Yukon _____ Bristol Bay)

Did you keep any of your commercial caught salmon for subsistence use?

No _____ (Go to question 7)

Yes _____ :

How many did you keep?

KINGS _____ CHUMS _____ SOCKEYES _____ SILVERS _____

Are these listed on the salmon calendar? Yes _____, No _____

***7. How many people live in this household?** _____

8. (For subsistence fishing households only)

How were the salmon and salmon runs this year? _____

***9. Do you have anything you would like to say about fishing regulations, such as problems or changes you would like to see? (record comments here)**

***10. Would you like to receive a summary of results of this survey? Yes _____, No _____**